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CONTENTS

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT.

ADDRESSES AND ORIGINAL ARTICLES.

Precancerous Lesions of the Alimentary Tract. By Prof. MATTHEW J. STEWART, F.R.C.P.—Lect. I. 565

The Poisoning Appendix. By J. MCDONNELL, M.R.C.S. 572

Albuminuria Complicating Pregnancy. By G. F. GIBBERD, F.R.C.S.—II. The Treatment 576

The Antirachitic Value of Irradiated Yeast. By STANISLAW K. KON, PH.D.—(*Illustrated*) 579

Insulin and Preservative: Note on the Effect of Insulin Solutions of Varying Reaction on the Viability of Staphylococci. By PERCIVAL HARTLEY, D.Sc. 582

Observations on the Production of Antipoliomyelitis Serum in Horses and the Distribution of the Antibody Among the Serum Fractions. By R. W. FAIRBROTHER, M.D., and W. T. J. MORGAN, M.Sc., F.I.C... 584

CLINICAL AND LABORATORY NOTES.

The Creases on the Minimal Digit in Mongolism. By L. S. PENROSE, M.D. —(*Illustrated*) 585

Wax Bath Treatment. By H. W. HALES, M.D. 586

BRITISH MEDICAL ASSOCIATION.

Section of Obstetrics and Gynæcology: Menorrhagias not due to Uterine Disease 587

Section of Orthopædics: Common Injuries of the Knee-joint 589

Section of Public Health: Air Travel. — Isolation Hospitals 591

REVIEWS AND NOTICES OF BOOKS.

Recent Advances in Medicine. By G. E. Beaumont and E. C. Dodds 593

Medical Administration of Teaching Hospitals. By Emmet B. Bay, M.D. .. 593

Crippled Children: Their Treatment and Orthopedic Nursing. By Earl D. McBride, F.A.C.S. .. 593

Allen's Commercial Organic Analysis. Under the Editorship of C. A. Mitchell, D.Sc., F.I.C. .. 594

Les diagnostics anatomocliniques de Paul Lecène. Recueillis par ses élèves. I. Généralités. By P. Pavie. Lésions du sein. By Prof. P. Moulonguet 594

Recollections of an Old and Observant Practitioner. By J. D. McFeely, F.R.C.S.I. 594

British Journal of Children's Diseases 594

LEADING ARTICLES

COLLAPSE OF THE LUNG AFTER OPERATION 595

ALUMINIUM AND HEALTH . 595

LATENT JUVENILE TUBERCLE 596

READING IN HOSPITALS .. 597

ANNOTATIONS.

Incidence of Disease Among Dairy Cows 598

The Pathology of Measles Encephalitis 599

Biological Data..... 599

The Time of Conception .. 599

Treatment of Hæmorrhage Following Prostatectomy 600

Liver Extracts for Parenteral Use 600

Congenital Pyloric Stenosis 601

A New Disease 601

The Biological Method in Psychiatry 601

Airport Medical Service .. 602

PANEL AND CONTRACT PRACTICE.

Sickness Claims: A Reply to Memo. 329 I.G.—Cost of Medical Service in 1930 603

SPECIAL ARTICLES.

Notes from India: Opium and Albuminuria.—Self-Help 605

United States of America: Differential Fertility.—The Broad Tapeworm .. 605

Berlin: Treatment of Puerperal Fever.—Efficacy of Meat Inspection 606

Scotland: Regius Chair of Forensic Medicine, Glasgow 607

PUBLIC HEALTH SERVICES.

Annual Reports of Medical Officers of Health: Birmingham.—Leicester 608

School Medical Service: Bristol; City and County of Nottingham 609

Infectious Disease in England and Wales 607

CORRESPONDENCE.

The Level of the Diaphragm (Dr. A. E. Barclay)—(*Illustrated*) .. 611

Dr. R. M. Buchanan's Work on Bacillus Typhosus (Sir Leslie Mackenzie) .. 611

A Revolving Solarium (Dr. Lennox Wainwright) ... 612

Pyrexial Treatment of Chorea (Dr. Charles E. Sundell) 612

Criteria of Cure in Pulmonary Tuberculosis (Dr. W. M. Crofton).... 612

Bendien's Work on Cancer (Mr. Roy R. Kerr)..... 612

Coining New Words 616

THE SERVICES.

Royal Naval Medical Service. — Royal Army Medical Corps. — Indian Medical Service. —Royal Air Force 604

OBITUARY.

Norman M. MacLehose, M.B. 613

Louis Sambon, M.D. 613

The Late Mr. Pattison Muir 613

Albert Edward Brindley, M.D. 614

PARLIAMENT.

The Parliamentary Session 614

MEDICAL NEWS.

Research Fellowship in Radiology..... 614

Stourbridge Corbett Hospital..... 575

Higher Payments to Contributory Schemes 582

Corbridge Maternity Hospital 582

Enlargement of Chelmsford Hospital..... 586

Society for the Study of Inebrity 602

Chartered Society of Massage and Medical Gymnastics..... 602

Cambridge University Press: Exhibition 602

King George Hospital Contributory Scheme .. 607

A Noise Silencer for Hospitals 607

The Seamen's Hospital.... 610

Fellowship of Medicine and Post-Graduate Medical Association 614

Hunterian Society 615

British Science Guild 615

NOTES, COMMENTS, AND ABSTRACTS.

British Waterworks 616

Royal Institute of Public Health 616

The Bead Test of Gastrointestinal Function 616

Walking on the Moors 616

Vacancies 615

Births, Marriages, Deaths. 615

Medical Diary 616

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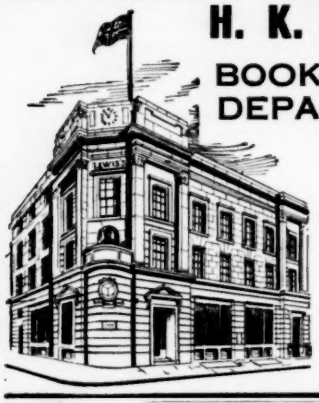

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PRECANCEROUS LESIONS OF THE ALIMENTARY TRACT.*

BY MATTHEW J. STEWART, M.B. GLASG., F.R.C.P. LOND.,
PROFESSOR OF PATHOLOGY IN THE UNIVERSITY OF LEEDS.

LECTURE I.

IN choosing as the subject of these lectures the precancerous lesions of the alimentary tract I had in mind two main considerations, one that it includes within its scope a number of pathological states for the study of which I could reasonably claim to have had exceptional opportunities; the other that it deals with matters of prime importance in medicine. The field is a big one, and I propose to concentrate on those aspects with which I am personally more familiar, and to make but passing reference to others of which I have had little or no experience. Of the importance of the subject it is hardly necessary to speak: the Registrar-General's statistical review for the year 1929 is sufficient demonstration. In that year there were 56,896 deaths from cancer in England and Wales, of which at least 60 per cent. in men and 42 per cent. in women were referable to the alimentary tract.

At the present time it is probably true to say that the most hopeful side of cancer research is that concerned with the demonstration of local causative factors, and the recognition and prevention of precancerous lesions of one kind or another. Unfortunately it is to the more superficial forms of malignant disease, a very small fraction of the whole, that this principally applies; precancerous lesions of the alimentary tract are by no means so well established, nor are there the same opportunities for prophylaxis.

The following is a rough attempt at classifying the chief precancerous lesions (or alleged precancerous lesions) of the various portions of the alimentary tract, and indicates also the order in which I propose to deal with them.

(*a*) Chronic inflammatory lesions: (1) leucoplakia; (2) lesions due to burns and chemical caustics; (3) cirrhosis of the liver; (4) hæmochromatosis; (5) cholelithiasis and cholecystitis; (6) chronic gastric ulcer; (7) chronic gastritis; (8) chronic duodenal ulcer; (9) diverticulitis.

(*b*) Simple tumours as precursors of cancer.

(*c*) Lesions due to animal parasites.

Leucoplakia.

The squamous epithelial lining of the mouth, pharynx and œsophagus, vulva, vagina and vaginal portion of the cervix, and part of the larynx, differs from the ordinary surface epithelium of the body in that it fails to form a definite stratum corneum, the effete surface cells being removed at an earlier stage of their development. In the so-called transitional epithelium of the urinary tract not only is there no keratinous layer, but even the stratum granulosum and stratum lucidum are lacking. In certain conditions of chronic irritation all this is changed, and patches of fully developed, highly keratinous epithelium make their appearance in the situations mentioned. The affected areas are white and opaque, stiff and unyielding, and in consequence liable to become cracked, fissured, and ulcerated. In leucoplakia vulvæ a special feature is the formation in the more advanced stages of a broad hyaline zone of dense collagenous deposit in the immediately subepithelial layer, accompanied by thinning and atrophy of the epithelium, complete or almost complete disappearance of the papillæ, and flattening out of the labia minora. In the tongue there is also an underlying chronic inflammatory lesion of the subepithelial layer which goes on to cicatricial fibrosis, but the broad, semitranslucent collagenous zone is not formed.

The distribution of leucoplakia is irregular and often asymmetrical. In the buccal cavity, much the commonest site, it affects chiefly the tongue, especially the anterior half of the dorsum and the margins, the commissures and cheeks, occasionally the lips, soft palate, and gums. The frequency of involvement of these sites in a series of 40 cases was found by Fox (1925) to be as follows: tongue, 28; commissures, 26; cheeks, 21; lips, 9; soft palate, 2; gums, 0. In the œsophagus it is seen first and chiefly in the lowest two or three inches, but may be widespread throughout the tube. The vulval lesion, not very uncommon, affects mainly the labia minora, but may extend on to the labia majora, perineum and thighs, and even encircle the anus. In the urinary tract, a much less frequent site, the bladder is the organ chiefly affected, the renal pelvis less than half as often, and the ureter and urethra only rarely. The combined figures of Hennessey (1927)—80 cases collected from the literature—and Kretschmer (1928)—13 new cases—are as follows: bladder, 49; bladder and ureter, 2; renal pelvis, 26; pelvis and ureter, 6; bladder, pelvis, and ureter, 3; ureter, 1; urethra, 3; not stated, 3; total, 93. Leucoplakia of the portio vaginalis cervicis is generally regarded as a rare disease, although Hinselmann, in a series of papers (*Cancer Review*, 1929, iv., 305) expresses the view that it is of frequent occurrence if only it is looked for.

ÆTIOLOGY.

This is different for different sites. In the mouth the chief cause is syphilis. Lane-Claypon (1930) found that in a collected series of 649 cases where the necessary information was available, 427, or 65·8 per cent., were definitely syphilitic. The lesion is a late one and is not amenable to antisyphilitic treatment. In the remaining cases, roughly one-third, other causes are at work, some of which are also additional factors in the syphilitic group, especially heavy smoking and more or less heavy drinking. Leloir (quoted by Lane-Claypon) gives details of the habits of 35 patients whom he investigated: 33 were heavy smokers and 27 more or less heavy drinkers. In this connexion attention is drawn to the extraordinarily low incidence of leucoplakia linguæ in women, only 3·5 per cent. of 848 cases collected by Cumston (1923) and 4·2 per cent. of 286 more accurately investigated cases collected by Lane-Claypon. It is particularly with reference to the tongue that a preponderatingly syphilitic ætiology is assigned. In leucoplakia of the lip there is little or no evidence that syphilis plays any part. Brofeldt (1927) investigated 25 cases of leucoplakia and 26 of cancer of the lips seen by him at Helsingfors in the period 1902–26. In none was there a positive Wassermann reaction or other evidence of syphilitic infection, and less than half were smokers.

Leucoplakia vulvæ is not a syphilitic affection; all observers are agreed on this point. It is probably related in most cases to cessation of the ovarian function, the average age at onset being 49 years (Taussig, 1929). In patients where the disease originates before the menopause there is usually a menstrual abnormality. Berkeley and Bonney suggest that coitus is an important factor. The ætiology of

* The Croonian Lectures delivered before the Royal College of Physicians of London on June 4th, 9th, and 11th, 1931.

leucoplakia of the portio vaginalis cervicis is even more obscure, although here again syphilis is discounted by most observers. According to Hinselmann (1928) most cases are due to "external irritative influences."

In the urinary tract chronic inflammatory and obstructive lesions are usually present. Thus Hennessey (1927) found the following associated conditions in 80 collected cases: cystitis, 58; obstructive lesions, 31; pyelonephritis, 25; calculus, 20; tuberculosis, 6; carcinoma, 4. In this series the bladder was affected with leucoplakia 47 times, the pelvis 32 times, and the ureter 11 times. In another (overlapping) series of 77 cases collected by Redewill (1929) the following lesions were present: chronic pyonephrosis, 25; hydronephrosis, 25; stone in the kidney, 10; stone in the ureter, 2; stone in the bladder 3; stone in the opposite kidney and ureter, 1; tuberculosis, 7; carcinoma, 4. Redewill makes the interesting suggestion that vitamin deficiency (especially deficiency of vitamin A) is an important ætiological factor (cf. xerophthalmia, which is a closely similar change in the conjunctival epithelium resulting from vitamin A starvation), and claims to have cured two cases by increasing the vitamin content of the diet and administering parathyroid.

RELATION TO CARCINOMA.

This has been so recently discussed by Lane-Claypon for carcinoma of the tongue that I content myself here with a brief reference to some of her main conclusions. She finds that up to the present time no data are available which enable the frequency of the supervention of cancer of the tongue in syphilitic subjects (or in those with leucoplakia, syphilitic or otherwise) to be ascertained. Yet there is no doubt that the association exists. The sex-incidence is similar; both show a remarkable preponderance in males (leucoplakia 95·8 per cent., carcinoma 90·2 per cent.). In a collected series of 447 cases of leucoplakia, 130 (29·1 per cent.) had already become cancerous, and in view of the youth of some of the patients there was still abundant time for others to develop malignancy. Perrin's figures, quoted by Lane-Claypon, are of interest. He analysed 102 cases of leucoplakia buccalis as follows:—

			With cancer.
Syphilitic (64).			
Leucoplakia of cheek and lips ..	11	....	0
,, tongue	53	....	10
Non-syphilitic (38).			
Leucoplakia of cheek and lips ..	15	....	0
,, ,, tongue	23	....	9

He concludes that syphilis does not predispose to leucoplakia of the lips or cheeks but does so for the tongue, and that syphilis in combination with tobacco is the commonest cause of cancer of the tongue.

The evidence for an association between leucoplakia and carcinoma of the œsophagus is extremely slight. I have only been able to find casual references to the subject in the literature, and my own experience in the post-mortem room has been of a negative kind.

Leucoplakia vulvæ is an accepted precancerous lesion, although here again it is impossible to get reliable figures. Berkeley and Bonney (1910), in reporting their personal experience of 58 cases of carcinoma vulvæ, state that they have not yet seen a case in which leucoplakia did not coexist. They report at the same time 19 cases of leucoplakia without malignancy. Taussig (1929), in a series of 76 cases of cancer of the vulva, noted leucoplakia in 39. In the same period he saw 40 cases of leucoplakic vulvitis without malignancy. Carcinoma vulvæ is more frequently multiple in origin than any of the commoner forms of malignant disease; 4 of Berkeley and Bonney's 58 cases were of this class, and I have recently seen a case of widespread leucoplakia of vulva, perineum, and anus in which early but unmistakable carcinoma was present at two widely separate points, one on a labium minus, the other on the anus.

The relationship between leucoplakia and cancer of the cervix is less securely founded. Hinselmann (vide supra), the chief exponent of leucoplakia cervicis as a pathological entity, believes that conservatively treated cases become carcinomatous in a few years, that in fact such leucoplakias represent the early non-invasive stage of carcinoma and not merely a precancerous condition. Cases supporting this view have been published by Rogge (1929) and Landesmann and Einoch (1929), but the total available evidence is scanty and unconvincing.

In the urinary tract also the evidence for an association between leucoplakia and cancer is inadequate. In recent years several American authors have analysed the literature, but the total number of cases is small. In 80 cases collected by Hennessey (1927) there were 4 cases of carcinoma, all squamous, an incidence of 5 per cent. Redewill (1929), in a partially overlapping series of 77 cases, had 4 cases of carcinoma, 3 in the bladder and 1 in the pelvis.

It may be concluded, therefore, that leucoplakia linguæ and leucoplakia vulvæ are definitely precancerous lesions, the former usually though not invariably due to syphilis, with heavy smoking and drinking as auxiliary factors. Leucoplakia vulvæ is not syphilitic. So far as the œsophagus, larynx, cervix uteri, and urinary tract are concerned, an association between leucoplakia and cancer is still unproved.

Lesions Due to Burns and Caustics.

Cancer of the lip.—One of the remarkable features of this disease is the great difference in its incidence in the two sexes. In a collected series of 4839 cases (Lane-Claypon, 1930) the proportion in males was 93·5 per cent. Another important point is the comparative rarity of cancer of the upper lip, 5·8 per cent. of a series of 3763 cases. Yet nearly one-quarter of all cases in women (50 out of 210) are in the upper lip, leaving for men only 88 out of 2466 cases (3·6 per cent.) so situated. Lane-Claypon discusses the ætiology at length, and concludes that there is no statistical evidence to support the view that smoking *as such* is causally related. There is reason to believe, however, that the unglazed clay pipe, especially when broken off short, may cause such chronic burning of the lower lip (with which it is in much more continuous contact) as to lead to cancer. Brewer (1923) states that in the district of Columbia only 8·04 per 100,000 white women over the age of 70 die from cancer of the lip, whereas the corresponding figure for negresses, a large proportion of whom smoke clay pipes, is 30·1 per 100,000.

The importance of prolonged exposure in the open air is stressed by Young and Russell (1926), who find that in agricultural labourers, merchant seamen, dock-labourers, and outdoor railwaymen cancer of the lip is 200 to 300 per cent. in excess of what might be expected. Masons, general labourers, farmers, graziers, and paviours come next with 60 to 100 per cent. excess. These open-air workers have in common unrestricted opportunities for smoking, and in the past, at least, clay pipes were much in favour amongst them. They mention the fact that coal-miners

working below ground, where smoking is forbidden, contrast with those working above ground in not suffering from excess of lip cancer. Young and Russell suggest that tobacco smoke may contain distillation products which act in a similar way to coal-tar and soot. There is no evidence to incriminate syphilis, and little or nothing to suggest an association with leucoplakia.

Betel-nut cancer of the cheek.—This also is fully discussed by Lane-Claypon (1930). It is clear that in certain districts of India and the East where betel-chewing is a widespread habit, the incidence of carcinoma of the cheek is extraordinarily high. Thus Fells in Southern India found that out of 377 cases of epithelial cancer seen by him, 91·5 per cent. were connected with the buccal cavity, 83·2 per cent. originating in the cheek, 9·3 per cent. in the tongue, and 7·5 per cent. in the lip. The betel "quid" is ordinarily carried inside the cheek, and it is on the buccal mucosa at this point, just opposite the molars and pre-molars, that the changes occur which ultimately lead to malignancy. Inflammatory thickening and roughening of the mucosa, leucoplakia, and epithelial denudation occur, and are followed by progressive ulceration.

There is, however, great variation in the cancer incidence in different betel-chewing populations. Thus Snijders and Straub (1923) found no evidence of its frequent occurrence in Dutch East Indies, where betel-chewing is common: Maxwell (1924) and Wells (quoted by Lane-Claypon) report similar experiences from Formosa and Guam. Snijders and Straub, from a review of the literature, give the following figures: Travancore, 652 buccal cancers amongst 1700 in all sites (38 per cent.); Madras, 411 in 976 (42·1 per cent.); Ceylon, 422 in 1325 (32 per cent.). Degorce in Tonkin saw only a few cases, while Montel in Saigon, in a similar (Indo-Chinese) population, saw many oral cancers. It is suggested that the difference may be due to the composition of the "quid," which varies in different countries and in different districts. Sabesan (1928) believes that in Madras the chewing of tobacco in addition to betel-nut is responsible for the high incidence, while for Singhalese, van Dort (1923) blames the short strong cigar much used by natives of Ceylon.

Betel-nut cancer, then, affords an excellent example of the importance of local factors in cancer causation, ranking in this respect with "kangri" cancer, tar and soot cancer, and mule-spinners' and X ray cancer.

Cirrhosis of the Liver.

INCIDENCE OF PRIMARY CARCINOMA.

Primary carcinoma of the liver is a rare disease in the white-skinned races. In Leeds, in 12,800 autopsies† during the period 1910–31, there were 14 certain cases, or 0·11 per cent. Even if 7 doubtful cases be added to this list the incidence is still only 0·16 per cent. If, however, only cases of 30 years of age and over are included, these figures become increased to 0·16 and 0·25 per cent. respectively.

† It is a serious objection to much of the published statistical material available that the age-distribution of the hospital populations from which it has been obtained is not clearly indicated. The figures for the Leeds General Infirmary during the period under review are as follows:—

Age- and Sex-Distribution of 12,800 Consecutive Autopsies at the Leeds General Infirmary, Jan. 1st, 1910, to May 5th, 1931.

Decade.	Males.	Females.	Totals.	
0– 9.. ..	1526	1079	2605	4887 under 30.
10–19.. ..	725	420	1145	
20–29.. ..	656	481	1137	
30–39.. ..	868	548	1416	7913 30 and over.
40–49.. ..	1147	657	1804	
50–59.. ..	1489	770	2259	
60–69.. ..	1225	559	1784	
70–79.. ..	412	158	570	
80–89.. ..	51	25	76	
90–99.. ..	2	2	4	
Totals ..	8101	4699	12,800	

Very similar figures have been recorded by other observers, both here and in America. It would appear, however, from numerous published observations that there is a much higher incidence among many non-white-skinned races (Table I.).

TABLE I.—*Racial Incidence of Primary Carcinoma of Liver.*

—	Total autopsies.	Cases of primary carcinoma of liver.	Percentage incidence.
English (Hale-White, Stewart)	31,300	39	0·12
Hungarian (Goldzieher and v. Bokay)	6,000	18	0·3
American and Canadian* ..	17,736	26	0·146
Chinese and Javanese† ..	1,075	25	2·3
South African Natives (Strachan)	1,100	22	2·0

* Clawson and Cabot, Fried, v. Glahn and Lamb, Counseller and McIndoe, Ophüls, and Strong and Pitts.
† Snijders and Straub, Ophüls, Strong and Pitts.

These figures show a statistically significant difference not only between English and American whites on the one hand and the Chinese-Javanese group on the other ($2·21 \pm 0·46$ per cent., and $2·18 \pm 0·46$ per cent. respectively), but also between the two former groups and the Hungarians ($0·18 \pm 0·07$ per cent., and $0·154 \pm 0·076$ per cent.).

Indirect evidence of racial variation is also available. Harvey Pirie (1921–22) found 36 primary cancers of the liver amongst 91 carcinomata in South African natives, whilst Snijders and Straub (1923) in the Dutch East Indies had 83 amongst 447 tumours examined (18·6 per cent.). Almost the whole of these liver cancers came from Javanese and Chinese patients, amongst whom they represented 57 per cent. and 32 per cent. respectively of all tumours examined. Snijders and Straub have also collected from the literature of the Far East much additional information on this point. Table II. is compiled from their data.

TABLE II.—*Incidence of Primary Carcinoma of the Liver in the Far East.*

Race.	Autopsies.	Cases of primary carcinoma of liver.	Incidence.
Japanese	12,212	125	1·02
Chinese	1,057	13	1·23
Javanese	658	8	1·22

Various explanations of this heightened racial incidence have been forthcoming. In the Far East and in South Africa the hepatic cirrhosis of schistosomiasis has been regarded as a possible factor, and in China, infestation by another fluke, *Clonorchis sinensis*. These are discussed in Lecture III. Snijders and Straub suggest that the "repeated and chronic affections of the sources of the portal vein" so frequently present in the native inhabitants of tropical countries "may play a part in the ætiology of cirrhosis and cancer of the liver." van Dort (1923) makes the suggestion that the varied incidence of primary cancer of the liver in different countries has a racial basis. He points out that in Europe there is a higher incidence among Magyar and Mongolian races than among those of Aryan stock; that Madras, peopled by Dravidians, shows a high rate, Calcutta and Colombo, inhabited by Aryans, a low, while the

incidence is again high amongst negroes, Chinese, and Javanese.

VARIETIES OF CARCINOMA.

There are two main varieties of hepatic carcinoma, the liver-cell type or hepatoma, and the bile-duct type or cholangioma (Yamagiwa, 1911). The older classification of Eggel (1901) into massive, nodular, and diffuse has a certain descriptive value, while the separation of a special type of "cancer avec cirrhose" (Hanot and Gilbert, 1888), has much to be said for it, especially on clinical grounds. Both histogenetic types may arise in cirrhotic livers, and may assume one or other of the three anatomical forms.

The main distinguishing features of the two types are briefly these (Winternitz, 1916).

(*a*) Liver-cell cancer has a trabecular structure, the cell columns being solid as a rule, although lumina may be present and may contain bile. Stroma is scanty in the extreme, practically only a capillary core, and the tumours are, in consequence, very soft. They are very liable to undergo central necrosis and hæmorrhage. The scantiness and looseness of the stroma is occasionally responsible for a remarkable pseudo-papillomatous formation (Fried, 1924; Keith and McNair, 1930). These apparent intracystic papillæ, which are really intravascular, are simply solid or luminated epithelial columns each enclosed in a delicate sheath of endothelium. The cellular structure is polymorphic, but nearly always one can find groups of cells with granular, well-stained cytoplasm, closely resembling the normal parenchyma cells of the liver. The formation of enormous giant cells, both mono- and multinuclear, is a not uncommon feature (van Heukelom, 1894; Muir, 1908), and plugs of inspissated bile may even be present within their cytoplasm (Rowen and Mallory, 1925).

(*b*) The bile-duct carcinomata are tubulo-adenomatous, have a more or less abundant, densely fibrous stroma, and are composed of cubical or subcolumnar cells with clear cytoplasm resembling the lining epithelium of the bile canaliculi. Atypical varieties of both tumours occur, and tumours apparently of mixed type, some being "so far removed from their usual morphology that some doubt must always remain regarding their true origin" (Ewing, 1928). Bile may be present in either variety, in the one case the product of the functional activity of the tumour cells, in the other a derivative of the surrounding healthy liver entering secondarily from without. Many hepatomas are yellow or orange in colour as a result of their high bile-pigment content, and in contradistinction to cholangiomas bile may be formed in the secondary deposits in the lungs (Cloin, 1901; Ménétrier, 1908; Ribbert, 1909; Parkes Weber, 1910; Fried, 1924).

Liver-cell carcinoma is much the commoner. In Eggel's collected series the ratio was 7 to 1, in Yamagiwa's roughly 2 to 1, and in Goldzieher's 3·5 to 1. In my series there were 9 hepatomas and 4 cholangiomas. Table III. shows that there is little or no difference in the comparative frequency in the white-skinned and coloured races.

TABLE III.—*Comparative Frequency of Liver-cell and Bile-duct Carcinomas.*

—	Total carcinomas.	Liver-cell type.	Bile-duct type.
European and American* ..	167	139	28
		Ratio 5 : 1	
Japanese (Yamagiwa)	42	27	15
Chinese (Snijders and Straub, Ophüls, Strong and Pitts) ..	36	30	6
Javanese (Snijders and Straub) ..	57	56	1
Negroes (Winternitz, Harvey Pirie)	34	32	2
	169	145	24
		Ratio 6 : 1	

* Eggel, Goldzieher and v. Bokay, Winternitz, Clawson and Cabot, Fried, Ophüls, Counseller and McIndoe, Strong and Pitts, Stewart.

RELATION OF CIRRHOSIS TO CARCINOMA.

That cirrhosis of the liver is a precancerous condition is now generally accepted. Most of the statistical evidence in support of this belief comes from figures showing a high incidence of cirrhosis in cases of primary cancer. Statistics showing the comparative frequency of primary carcinoma in cirrhotic and non-cirrhotic livers respectively are remarkably few. My own figures have been worked out on this basis.

Multilobular or portal cirrhosis is a disease of middle and later life. After excluding from my series all cases of Banti type, and all cases of post-necrotic (post-atrophic) fibrosis, whether accompanied by multiple nodular hyperplasia or no, there remain 269 patients with cirrhosis of whom five only were under the age of 30. All the cases of primary carcinoma but one were also over 30, and I have therefore made a correction for age by including only those who were 30 years of age or over.

TABLE IV.

Incidence of primary cancer of the liver in 7913 patients 30 years of age and over (from a consecutive series of 12,800 autopsies at all ages at the Leeds General Infirmary).

		Per cent.
Cases without cirrhosis	7649	—
Cases of primary cancer therein ..	4	0·052
(With 7 doubtful cancer cases included)	11	0·144
Cases with cirrhosis	264	—
Cases of primary cancer therein ..	9	3·41

Table IV. shows, therefore, an enormous preponderance in favour of the cirrhotic group.

Two incidence-rates for the non-cirrhotic cases are given, one including only those primary carcinomas which satisfy the most stringent requirements, the other with the doubtful cases added. With the former the cancer incidence in cirrhosis is 66 times, with the latter 24 times greater than in the non-cirrhotic group. Even for the latter the difference is statistically significant (3·27 ± 1·12 per cent.).

Similar findings were obtained by Ophüls (1926). In 128 cases of cirrhosis of the liver over the age of 30 there were 8 with primary carcinoma (6·2 per cent.), while in the corresponding group without cirrhosis there were 3 cases of cancer in 2111 (0·14 per cent.), a ratio of 44 : 1.

Blumenau (1920–21), in 12,761 autopsies, encountered 198 cases of cirrhosis of all grades, of which 7 were associated with primary carcinoma (3·5 per cent.).

These three series include all grades of cirrhosis recognisable by the naked eye, whereas carcinoma, when it occurs in a cirrhotic liver, does so as a rule late in the disease. In my series, if the slighter cases of cirrhosis are excluded, there remain, over the age of 30, 124 cases of cirrhosis with 9 cases of cancer, an incidence of 7·3 per cent.

Approaching this problem from the other direction, we find in the literature abundant evidence in support of the contention that a large majority of carcinomas of the liver, especially those of liver-cell type, arise in cirrhotic organs (Table V.).

TABLE V.—*Frequency of Cirrhosis in Cases of Primary Carcinoma of the Liver.**

—	Cases.	With cirrhosis.
Liver-cell carcinoma ..	246	219 (89·0 per cent.)
Bile-duct ,, ..	49	25 (51·0 ,,)

* Collected from the series of Eggel, Goldzieher and v. Bokay, Karsner, Yamagiwa, Winternitz, Harvey Pirie, Snijders and Straub, Fried, v. Glahn and Lamb, Counseller and McIndoe, Strong and Pitts, and Stewart.

The incidence of cirrhosis is thus significantly higher in liver-cell than in bile-duct cancer (difference 38·00 ± 7·41 per cent.).

Carcinoma occurring in a cirrhotic liver is the end-stage of a well-recognised series of pathological changes. Both portal cirrhosis and acute cytolytic necrosis are due to the action of toxic substances, some of which are either definitely known or strongly suspected—e.g., trinitrotoluene in the one case, and alcohol or some associated substance in the other. But there is a vast difference in the mode of action of the causative agents in the two diseases. Cytolytic necrosis occurs rapidly, and the final result depends partly on the severity of the intoxication, partly on the extent of the destructive lesion. If necrosis is very extensive death ensues within a few days, and the condition is known as acute yellow atrophy. If a certain, perhaps even a small, amount of liver tissue withstands the toxic onslaught, the patient may survive for some weeks or months, and at autopsy the destroyed liver tissue is found to have become replaced by cellular fibroblastic tissue, the surviving islets of parenchyma being in a state of more or less active proliferation. This is the stage of subacute atrophy or necrosis. Finally there are the cases which survive for many months or years, and in whom the regenerated liver tissue compensates more or less adequately for what has been destroyed. Such livers often present the appearance known as multiple nodular hyperplasia, with numerous rounded nodules of regenerated functioning liver tissue separated by broad tracts of post-necrotic fibrosis. In cytolytic necrosis all the damage to the liver is done at one blow. Once the destroyed tissue has become fibrosed and a certain degree of regenerative hyperplasia attained the lesion becomes static.

In cirrhosis, on the other hand, the toxic action is long continued, and the destructive effect, with its associated demand for compensatory hypertrophy, probably lasts many years. The lesion, in short, is a progressive one. I believe it is for this reason that the process does not always stop short at the stage of multiple nodular hyperplasia. From time to time cases are encountered in which actual liver-cell adenomata are formed, and this in turn may be followed by malignancy. Sabourin (1881, 1884) was the first to suggest that multiple nodular hyperplasia might be an intermediate stage between cirrhosis and cancer, a view since strongly supported by Orth (1887), Schmieden (1900), Muir (1908), Turnbull and Worthington (1908*a*), and others. I believe, however, that this applies only to the nodular hyperplasia of cirrhosis. I am unaware of any reported case of primary cancer arising in a liver the seat of post-necrotic fibrosis with multiple nodular hyperplasia. In none of 13 cases of post-necrotic fibrosis encountered in the post-mortem room at Leeds was there any evidence of new growth. In the patients who recover from cytolytic necrosis and in whom the regenerated liver is sufficient to maintain life, no further destruction of cells takes place (unless they go through a fresh attack, which is rare), and no further demand for compensatory hypertrophy. In cirrhosis there is "a progressive destruction of liver-cells, followed by a progressive compensatory hypertrophy and hyperplasia" (Muir, 1908), which in a not inconsiderable number of advanced cases "oversteps the normal, and takes on the autonomous character of a new growth."

An interesting controversy has ranged around the question of the unicentric or multicentric origin of primary liver-cell cancer. The chief supporters of the latter (and earlier) view are van Heukelom (1894), Löhlein (1907), Muir (1908), Goldzieher and v. Bokay (1911), and Yamagiwa (1911); of the former, Ribbert (1909, 1911), Karsner (1911), Winternitz (1916), and Counseller and McIndoe (1926). That adenomata of the liver are frequently multiple, especially in the cirrhotic organ, everyone will admit. So far as primary liver-cell cancer is concerned, I am strongly of the opinion that most, if not all, of the cases of apparently multicentric origin can be explained in other ways. Primary cancer, especially of the liver-cell type, readily invades the portal vein, which becomes occupied by a solid yellowish mass, partly thrombus, partly tumour tissue. The growth extends along the lumen in both directions from the point of entry, ultimately forming a tree-like cast of the affected portion of the portal system. It is these growth-distended vessels seen on section which give the appearance of a tumour of multicentric origin. Furthermore, when once the portal system has been invaded dissemination to other parts of the liver readily occurs (Willis, 1930). Invasion of the hepatic vein is less common, and in rare instances the inferior vena cava is permeated and obstructed by growth (Fabyan, 1907; von Glahn and Lamb, 1924; Rowen and Mallory, 1925; Counseller and McIndoe, 1926).

Bile-duct carcinoma, although it grossly invades both portal and hepatic veins less frequently than liver-cell cancer, is more liable to give rise to extrahepatic metastases. Table VI. is compiled from my own cases, and from those of Muir (1908), Turnbull and Worthington (1908*b*), Karsner (1911), Winternitz (1916), von Glahn and Lamb (1924), and Counseller and McIndoe (1926).

TABLE VI.—*Frequency of Vascular Permeation and Extrahepatic Metastasis in 44 Cases of Primary Carcinoma of the Liver.*

—	Cases.	Invasion of		Regional gland secondaries.	Pulmonary secondaries.	Bronch. gland secondaries.	Deposits elsewhere.
		Portal vein.	Hepatic vein.				
1. Hepatoma ..	33	28	4	4	6	0	0
2. Cholangioma	11	5	0	4	3	3	6

In all, there were 16 cases (9 out of 33 hepatomas and 7 out of 11 cholangiomas) with extrahepatic metastases (36·4 per cent.). In Eggel's series of 163 cases there were 66 with extrahepatic metastases (40·5 per cent.), including 23 cases of lung involvement —14 per cent., as compared with 20 per cent. in the above series.

It is scarcely necessary after this to discuss the various other hypotheses as to the relation of the cirrhosis and the cancer; that the two are independent, that they occur simultaneously in response to some common stimulus (Hanot and Gilbert, 1888), that the cancer is the cause of the cirrhosis. For the first and second no case has been made out. With regard to the third, it is true that liver-cell carcinoma in particular may stimulate the formation of a wall of fibrous tissue around it, but this is a strictly local development, and does not extend into the normal parenchyma of the rest of the organ.

CIRRHOSIS AND SARCOMA.

Sarcoma of the liver is an extremely rare disease. As in carcinoma there is a certain association with cirrhosis. Jaffé (1924) has collected and analysed the available data. He finds that of 48 cases of sarcoma 15, or 29·2 per cent., were accompanied by cirrhosis.

Hæmochromatosis.

Hæmochromatosis is a disease in which enormous quantities of the iron-containing pigment hæmosiderin are deposited in various organs of the body, but especially in the liver, which, whether as a result or as a cause of the siderosis, or independently, becomes the seat of multilobular (portal) cirrhosis of the usual type. The deposition of pigment is unassociated with other evidences of excessive hæmolysis, and belongs therefore to an entirely different category from the siderosis of Addisonian anæmia or hæmolytic jaundice. The free iron content of the liver may be as much as 6 or 7 per cent. of the dry weight, and the total iron content anything up to 30 g. or more instead of the normal 0·3 g. or less (Muir and Dunn, 1914–15).

There occurs also an enormous accumulation of hæmosiderin in the upper abdominal lymph glands, especially those of the cœliac group, where the iron content may be 14·69 per cent. of the dry weight (Anschütz, 1899). It is clear that the bulk of this pigment is transported thence from the liver, to some extent also from the pancreas. No such transportation to or accumulation of pigment in the cœliac glands occurs in the hæmolytic anæmias, probably because of the need for and the availability of the iron-containing fraction for further erythropoiesis.

After the liver, in pernicious anæmia the kidneys show the largest amount of pigment, and may even be the organs chiefly or solely affected. In hæmochromatosis renal siderosis is usually very slight. In Muir and Dunn's case the iron content was only 0·406 per cent., as compared with 6·43 per cent. in the liver and 2·49 per cent. in the pancreas. Apart from the liver and kidneys no appreciable degree of siderosis occurs in pernicious anæmia. In hæmochromatosis the pancreas ranks next to the liver and lymph glands as the chief site of iron deposition. It is unusual for the spleen to be much affected, but the heart-muscle, suprarenals, skin, thyroid, prostate, salivary glands, stomach, and choroid plexuses may all show considerable or even great pigmentation.

INCIDENCE.

In the collected series of 38,095 autopsies in five British hospitals shown in Table VII. there are 52 cases of hæmochromatosis (0·136 per cent.). Strachan (1929) found a much higher incidence both in South African natives (3·0 per cent.) and in the white inhabitants of that country (1·38 per cent.), but failed to discover any satisfactory explanation. In my series there were 264 cases of cirrhosis of the liver 30 years of age or over, and as all my 13 cases of hæmochromatosis showed cirrhosis and were over 30, the incidence of hæmochromatosis in this group is 4·9 per cent. Hæmochromatosis, however, is mainly a disease of males—there were no women in my series—and here the incidence rises to 7 per cent.

ÆTIOLOGY.

The ætiology of hæmochromatosis is very fully and adequately discussed by Rolleston and McNee (1929), and I shall only refer here to one or two salient points. It is a very obscure problem, and no definite conclusions can as yet be stated.

(1) There is general agreement that the siderosis is not dependent on increased hæmolysis. As already shown, the amount and distribution of the pigment differs widely in the two cases, and there is no evidence of excessive hæmolysis.

(2) There is a preponderance of opinion in favour of the view that in the liver the cirrhosis is antecedent to the siderosis, and in support of this the fact that chronic alcoholism is a frequent precursor of both diseases has been cited. This ætiological conception, however, fails to explain the widely generalised siderosis of hæmochromatosis, nor does it throw any light on the fibrosis of the pancreas which occurs in some cases.

(3) Mallory and others (Mallory, Parker, and Nye, 1920–21; Mallory, 1925, 1926) have advanced the view that the cause of the disease is chronic copper poisoning, and have adduced much clinical evidence in support of their contention. It is indeed a remarkable fact that Mallory should have had such an extraordinary run of cases since long-suffering Americans have taken to distilling their own "hooch" in copper-tubed stills, but there remains the difficulty of accounting for the vast quantities of iron present. Clearly in many of the cases the process of siderosis must have been in existence much longer than the supposed period of exposure to copper, dating from days when good corn and rye whisky was the favourite tipple of American inebriates. If, on the other hand, the source of the copper is the lining of pans used for jam-making and other culinary purposes, or the colour-preservatives added to canned vegetables, why is the disease limited to such an extraordinarily small fraction of the population, and in particular, why is there such an extreme preponderance in the male sex? Mallory's experimental results in support of the copper theory fail to carry conviction (Flinn and von Glahn, 1929; Polson, 1929). It may be mentioned that in Korea, where bronze and copper vessels are habitually used, R. G. Mills (1925) found no evidence either of hæmochromatosis or of an increased incidence of diabetes.

(4) There remains the hypothesis, which unfortunately does not carry us much further, that the essential factor is "a special affinity of the tissues and organs for iron" (Muir, 1921). The *cause* of this accumulation is unknown, although the *source* of the iron must obviously be the food. The total iron content of the body in advanced cases is so enormous that at the normal rate of intake (10 milligrammes of iron per day on an ordinary diet (Stockman, 1895, 1897)), it would require many years to accumulate, even if all the iron ingested were retained. It is even possible that the condition is lifelong, but as against that must be set the fact that the disease, even in its early stages, is hardly ever encountered before the age of 30. That there is a failure of elimination of iron may be assumed.

It is an equally attractive hypothesis that damage to parenchyma cells by surcharge with iron pigment is the cause of both hepatic and pancreatic sclerosis, perhaps also of a cortical adrenal lesion leading to genuine Addisonian pigmentation. Contrary to Rolleston and McNee, I find that siderosis of the cœliac lymph glands sets up a definite fibrosis of these structures, nor do I agree that the absence of hepatic fibrosis in the hæmolytic anæmias, where siderosis is relatively slight and probably intermittent, is an argument against this hypothesis. Siderosis of liver-cells in varying degree is present in many cases of ordinary multilobular cirrhosis, but there is no evidence of any close relation between this condition and hæmochromatosis.

RELATION TO CARCINOMA.

Hæmochromatosis, when recognisable as such in the post-mortem room, is invariably accompanied by some degree of hepatic cirrhosis, and might therefore be expected to have an association with primary carcinoma of the liver. My interest in this side of the problem has been stimulated by the fact that in the past 16 years I have encountered no fewer than three instances of this association in a series of 13 cases of hæmochromatosis seen in the post-mortem room at Leeds. In such a small series one naturally assumed that this was a mere error of random sampling, and in order to get a more truthful figure I have collected a number of series, published and unpublished. Through the kindness of Profs. Muir, Turnbull, and Kettle, and Dr. Newcomb, I have been supplied with the lists of cases of hæmochromatosis occurring at the Western Infirmary of Glasgow, the London Hospital, and St. Bartholomew's and St. Mary's Hospitals respectively during the last 15 or 20 years. In making a collection from the literature only *series* of cases have been included, not isolated

examples, since it seemed probable that the latter would include an undue proportion of rarities such as the one under discussion. Table VII. gives the results of the inquiry.

TABLE VII.—*Incidence of Primary Carcinoma of the Liver in Hæmochromatosis.*

—	Autopsies.	Cases of hæmochromatosis.	With primary cancer of liver.	Percentage.
Unpublished Series.				
Glasgow, Western Infirmary, 21 years	4,034	14	1	—
Leeds, General Infirmary, 21 years	12,800	13	3	—
London Hospital, 17 years	10,626	15	1	—
St. Bartholomew's Hospital, 20 years..	8,147	4	0	—
St. Mary's Hospital, 14 years	2,488	6	1	—
Totals	38,095	52	6	—
*Published series** ..	—	66	6	—
Grand total (white subjects) ..	—	118	12	10·2
Strachan (South African Natives) ..	1,100	33	3	9·0
Grand total ..	—	151	15	9·93

* Those of Althausen and Kerr, Blanton and Healy, Bork, Letulle, Mills (E. S.), Ophüls, and Strachan.

The total figure (9·93 per cent.) is a somewhat higher incidence than is met with in cirrhosis generally—viz., 3·41 per cent. A fairer comparison, however, would be with cases of established cirrhosis after excluding the slighter grades. In my series there were 124 such cases, with 9 cases of cancer, an incidence of 7·3 per cent. As the difference between these rates (2·67 per cent.) is less than its standard error (3·37), it is not possible to attach any significance to the apparently higher rate in hæmochromatosis. The causative factor in both groups is the cirrhosis, the siderosis probably playing no direct part. In passing it may be mentioned that cases of primary carcinoma of the pancreas with hæmochromatosis have been reported by Critchlow (1929) and Strachan. It is unlikely that this association is other than accidental.

Primary carcinoma of the liver in hæmochromatosis is similar to the disease as it occurs in ordinary portal cirrhosis. For purposes of comparison I have collected in Table VIII. all the 14 reported cases which I have been able to find in the literature, adding thereto my own three. I know of seven other unreported cases, four in Great Britain (Muir, Turnbull, Dunn, and Polson), and three in South Africa (Strachan).

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TABLE VIII.—SEVENTEEN CASES OF HÆMOCHROMATOSIS WITH PRIMARY CARCINOMA OF THE LIVER.

Case No.	Author and date.	Sex and age.	Duration of symptoms (years).	Alcoholism.	Glycosuria.	Fibrosis of pancreas.	Pigmentation of skin.	Jaundice.	Ascites (c.cm.).	Size of liver (gm.).	Type of cancer.	Siderosis of tumour cells.	Invasion of veins.	Secondaries.
1	Letulle, 1897.	M. 50	3/12	−	−		−	−		2150	Hep.	−	Portal.	−
2	Rindfleisch, 1901.									Red.	„	+		
3	Löhlein, 1907.	M. 57	5		−	+	−	+	1700 hæm.	Enl.	„	−	Portal, hepatic, inf. vena cava.	Lungs, bronchial glands.
4	Winternitz, 1916.	M. 52	2/52 +31	+ +			−	−	700	4200	„	−	Portal.	−?
5	Achard and Leblanc, 1921.	M. 55	3/12	+ + +	−		+ + +*	+	+ + + hæm.	3450	Chol.	−		Lungs.
6	Blanton and Healy, 1921.	M. 49	6/12	−	+	+	+	−	+ +	5085		+	−	Pancreas, peritoneum, pleura.
7	Mills (E. S.), 1924. 1	M.						−	−	5400	Hep.			
8	„ „ „ 2	M.						+	+	1900	„			
9	„ „ „ 3	M.						+	+	Enl.	„			
10	Althausen and Kerr, 1927.	M. 67	1 2/12	+	−	+	+ +	+	+	„	„		Portal.	Local glands.
11	Hibbs, 1927.	M. 64	Hours.	+ + +			−	−	−?	2900	Chol.	−	„	−?
12	Donaldson, 1929.	M. 59	2/12	−	−	+	−	sl.	+ + + hæm.	Enl.	Hep.	−	−	−?
13	Keith and McNair, 1930.	M. 58	10	−	+	+ + +	+	−	6000	4320	„	−	−	−
14	Orr, 1930.	M. 54	6/52	−?	−		+	−	1130	2700	„	−	−	−
15	Stewart, 1931. 1	M. 49	1	+ + +		+	−	−	+ hæm.	3090	„	−	Portal.	−
16	„ „ 2	M. 71	5/12	+ + +			−	−	+ hæm.	Enl.	„	−	„	Local glands.
17	„ „ 3	M. 59	Hours.	−		tr.	+	−	−	1390	„	−	„	−

* Addison's disease from tuberculosis of the adrenals coexisted.
Red. = reduced; Enl. = enlarged; Hep. = hepatoma; Chol. = cholangioma.

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THE POISONING APPENDIX.

BY JAMES McDONNELL, M.R.C.S. ENG.

THE following investigations suggest that our views on appendicitis should be recast, and that, instead of visualising appendicitis as acute or subacute, to be followed by chronic disease, we should realise that the first evidence of trouble in the appendix is made manifest by nebulous symptoms which, in the aggregate, cannot be accounted for by any other than a toxæmic origin. Hence we must view disease of the appendix as primarily a poisoning, with either subacute, acute, or chronic sequelæ. This opinion is diametrically opposed to that of A. J. Walton [1] who, at the Edinburgh meeting of the British Medical Association in February, 1927, doubted the existence of chronic appendicitis, apart from remainders left over from an acute attack, either as the cause of upper abdominal symptoms or as causing pain in the right iliac fossa. Speaking at the Royal Society of Medicine, he declared that his own cases "failed to reveal a single case of appendicitis chronic from the beginning." [1]

The "poisoning appendix" gives a physical sign which has hitherto not been described—viz., increased resistance of the upper segment only of the right rectus, in an otherwise normal abdomen. This increased resistance is easily appreciated, but does not in any way simulate the form of resistance found in epigastric lesions. This sign tends to merge into that mentioned by W. Trotter,[2] who pointed out that a definite difference in the tension of the two recti is probably the best physical sign of chronic appendicitis, but it differs in that the lower two segments of the rectus are generally unaffected.

The radiographic evidence in these cases can be summed up in the expression: "a non-functioning appendix"—i.e., an appendix which, on account of some pathological changes, will not fill or, per contra, will not empty within the somewhat elastic time-limit accepted as being the rate of filling or emptying of normal appendices; or one of which the outline or limitation of movement is due to obstruction either from within or from without—e.g., concretions, constructions, kinks or adhesions.

This evidence conforms in detail with that already described by Friedman [3] in chronic appendicitis. In addition, however, emphasis should be laid upon the importance of finding calcareous glands round the ileocæcal region. There has been much controversy as to the origin of calcareous glands in the neighbourhood of the cæcum. In this group of cases these appear to have no origin other than that due to inflammation from the area drained by these glands; out of 18 cases with symptoms of poisoning and a

[1] THE LANCET, 1928, i., 595.
[2] Brit. Med. Jour., 1927, ii., 1063.
[3] Med. Jour. and Rec., Oct. 1st, 1924, p. 110.

(Continued from previous column.)

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non-functioning appendix, 13 had this glandular involvement.

I hope to show that, other causes having been eliminated, a "poisoning appendix" is a non-functioning appendix, with a toxæmic symptomatology for which the only treatment is appendicectomy. Every care must be taken not to condemn a patient to an operation on the basis of a non-functioning appendix alone if maximum beneficial results cannot be expected. It is particularly necessary to be on guard with female patients, as they are subject to a complexity of symptoms, due to manifold forms of endocrine dysfunction, which closely simulate a picture of toxic origin.

The clinical picture is one of symptoms arising from a condition of either slow general toxicity—e.g., lassitude, general malaise, loss of energy—or one of a more advanced toxæmic state showing pyrexia, with the additional complication of vomiting, should a subacute local inflammation of the peritoneal tissues have occurred. None of my patients has ever exhibited pain, tenderness, or discomfort in the right iliac fossa, except when pressure has been applied to a full cæcum during X ray examination.

The usual and various causes of toxins must be eliminated. Having excluded dental and tonsillar sepsis, and any other form of toxin, one is justified in assuming that the toxin arises in the alimentary tract. Detailed X ray investigation of the tract finally allocates the blame. D. P. D. Wilkie and others maintain that intestinal infections produce a chronic septicæmia. These cases show that a general toxæmic state caused by a fault in the intestinal tract can be eradicated by early detection and removal of the appendix.

All surgeons and physicians have seen many cases of apparently incomprehensible cure where symptoms have pointed to no definite pathological lesion and where in desperation the appendix has been removed. Robert Hutchison [4] emphasised that, even if an exploration does not reveal anything wrong with the appendix, the surgeon seldom draws a blank—a kink, mesenteric gland, or band will, as a rule, reward the search.

In the appended details of cases, departures from the normal are alone mentioned. Every case was thoroughly investigated: the chest was examined—frequently with X ray screening—and the urine, teeth, and tonsils were studied. The summary gives a terse and concrete picture. The classifications under the heading "main symptoms" are necessarily arbitrary.

Illustrative Cases.

GROUP I.—SYMPTOMLESS PYREXIA.

CASE 1, a man aged 38 years, complained of three attacks of symptomless pyrexia, the first in July, 1926, lasting three days; the second in January, 1927, lasting one week; the third in November, 1927, lasting one week, and accompanied by one severe bout of vomiting. From the summer of 1927 to June, 1928, there was an increasing lassitude, with a feeling of heaviness and staleness, the patient awakening so tired in the morning that he frequently had not the energy to dress. In July, 1928, he went for a holiday to the South of France, but received no benefit from his sojourn there. He further described his condition as "a curious feeling that my faculties were dying."

On Oct. 1st, 1928, I was called in for another attack of symptomless pyrexia, with a history of mild temperature for the previous ten days. Lassitude was the only outstanding feature. Physical examination was negative except for the abdomen, where a thickened, distended cæcum and descending colon were easily palpable. There was no tenderness at all. The upper segment of the right rectus showed a slight but definite resistance as compared with the musculature of the rest of the abdomen. The patient's conjunctivæ were unhealthy-looking, and had a marked premature arcus senilis. Rectal examination was negative. The Widal reaction was negative. The fæces showed streptococcal excess.

A barium X ray meal on Oct. 11th, 1928, showed the following abnormalities:—7 hours after ingestion: (1) cæcum fixed, rather tender; (2) no normal appendix seen. 23 hours after ingestion: (3) cæcum not emptying, not movable; (4) absence of normal appendix. The radiologist further reports: "There is some evidence that the appendix is closely apposed to the cæcum. Under the screen it was never free from the cæcum. There was also a negative shadow in its lumen, and this is very suggestive of concretion. The appendix at no time fills fully. There is also a small gland on the inner side of the cæcum which is possibly related to the appendix."

Appendicectomy was performed on Oct. 22nd, 1928. On opening the peritoneal cavity a small quantity of free fluid was seen. There was a general inflammatory intestinal condition. The appendix was injected and œdematous at its distal end; the cæcum was tethered to the posterior abdominal wall and markedly thickened.

Within five days the patient's entire external appearance had changed. The conjunctivæ looked healthy and normal. Lassitude had entirely disappeared. Eighteen months later he was perfectly well and had had no return of symptoms.

CASE 15, a boy aged 11 years, had had repeated attacks of pyrexia of two days' duration, his temperature rising to 103°. Beyond the general complaint of malaise, there had been no specific symptoms, no aches or pains, no sickness, no alteration in the activity of the bowels. He felt seedy and was off his food. By the third day on each occasion he had been up and about, and had returned to school about the fifth day. The first attack took place in June, 1929, and subsequent attacks in July, September, and November, 1929. Two further attacks took place, on Dec. 14th, 1929, and Jan. 6th, 1930.

No abnormal physical sign could be elicited. A barium meal on Jan. 29th showed the following abnormalities:—23 hours after ingestion: (1) ? partly-filled appendix close to the cæcum. 32 hours after ingestion: (2) no appendix visible. The radiologist further reports: (3) "At no time was a normal appendix visible. Tenderness was absent. The gastro-intestinal tract emptied rapidly. (4) Some calcareous glands were present in the right iliac fossa."

Appendicectomy was performed on Feb. 12th, 1930. The appendix, which had multiple adhesions, was coiled on itself and removed with difficulty. Ten months later he had had no return of his pyrexial attacks, and had gained very considerably in weight. His mother reports that he is in better health and spirits than she has ever known him, and that the change is almost unbelievable.

GROUP II.—PYREXIA AND VOMITING.

CASE 11, a boy aged 6 years, was a thin, puny, emaciated lad who had been treated with tonics for general debility at long and frequent periods since 1927. The only definite history elicited, apart from that of general malaise, was one of increasingly frequent bouts of severe vomiting, accompanied by pyrexia. Two severe bouts of unaccountable vomiting occurred within the first three weeks of September, 1929. These attacks were accompanied by pyrexia up to 100·4°. It was alleged that for the past nine months, when these attacks were at their zenith, patient voided clay-coloured stools. Most careful abdominal examinations were made during the attacks by four different doctors, but showed not even the slightest degree of abdominal tenderness or rigidity. A barium X ray meal on Sept. 30th, 1929, showed the following abnormalities:—6 hours after ingestion: (1) cæcum not movable, tender. (2) Appendix not visible. 31 hours after ingestion: (3) quite a fair amount of barium is left in cæcum. The radiologist further reports: (4) "Throughout examination appendix never filled completely. (5) There is some evidence that a small gland is present on the inner side of the cæcum."

At appendicectomy on Oct. 7th the appendix was found bound down by mesenteric adhesions, constricted at its proximal end, and fibrotic throughout its entire length. Large calcereous glands were felt. A year later the patient was doing better than he had ever done, and was full of vim and energy. He had had no recurrence of any symptoms and was gaining weight. His mother writes that his appetite is so good and his energy so great that she sometimes wishes that his appendix could be returned to him!

GROUP III.—MALAISE AND LASSITUDE.

CASE 13, a very busy professional man, gave a history of three years' increasing "fatigue" and lack of energy unrelieved by holidays or any form of treatment, the fatigue coming on in waves so severe as to render him totally

[4] Ibid., p. 444.

incapable of carrying on with his work without periods of rest. He had lost weight. In 1927 his condition was believed to be due to myocardial failure, but this opinion was negatived by the report of the cardiac specialist. Rest and tonics were prescribed. In October, 1928, he had some lower abdominal discomfort, and complained of constipation and of feeling the whole of the cæcum against the abdominal wall.

The cæcum and descending colon were thickened and easily palpable, but there was no tenderness. A barium X ray meal on March 21st, 1929, showed the following abnormalities:—(1) Hyper-activity of the duodenum. 6¼ hours after ingestion: (2) cæcal pole very movable. Appendix partly but only slightly filled. 8¼ hours after ingestion: (3) freely movable appendix not obvious either on film or on screen. 48 hours after ingestion: (4) cæcum contains some barium mixed with food. The radiologist further reports: (5) "Appendix did not fill like 99 per cent. of normal ones, but that is the only point against it."

The condition was believed to be due to visceroptosis and overwork. One month's rest in a nursing home with abdominal massage was prescribed, preceded by two weeks' holiday. The constipation was entirely relieved, but the "fatigue" continued unrelieved.

Six months later, the fatigue condition having become unutterably intolerable, and the patient totally unable to carry on with his work, appendicectomy was decided upon. At operation on Nov. 22nd, 1929, the cæcum was found adherent to the abdominal wall. There was a mass of adhesions round the appendix, which was twisted on itself, the two loops being adherent. The appendix was opaque and thickened, with congested vessels. Twelve months later the toxæmic symptoms had entirely disappeared, and the patient was very well.

GROUP IV.—MALAISE, LASSITUDE, AND ABDOMINAL SYMPTOMS.

CASE 16, a boy aged 16¼ years, stated that from Christmas, 1929, to February, 1930, he had had discomfort in the epigastrium a quarter of an hour after meals, but no vomiting. On one occasion he had had acute pain round the umbilicus, lasting for five minutes. This had doubled him up, but had not been accompanied by vomiting. He had had constipation for 12 months.

Increased resistance was found in the upper two segments of the right rectus. A barium meal on Feb. 26th, 1930, showed the following abnormalities:—Excessive peristalsis, to-and-fro movement in the duodenum. 7 hours after ingestion: (1) appendix partly filled; ? kinked; no tenderness. 8¼ hours after ingestion: (4) appendix slightly movable; no tenderness. The radiologist further reports: (3) "Previous to giving the meal, a film of the abdomen shows a large calcareous mesenteric gland."

Although in this case the diagnosis of "poisoning appendix" was made, the surgeon did not agree, and

Case	Age.	Shown by X rays: alterations from normal.		—	Main features at operation.	Age.	Case
		In upper abdominal tract.	In cæcal area.				
		Symptomless Pyrexia (Two Cases).					
1	38	—	Appendix not seen. Cæcum not movable. Tenderness.	C. gs.	Free fluid. Appendix injected, œdematous. Cæcum bound down by adhesions.	38	1
15	11	Excessive peristalsis.	Appendix not filling properly.	C. gs.	Multiple adhesions.	11	15
		Pyrexia and Vomiting (Three Cases).					
2	51	Gastric rate of emptying unduly rapid.	Fixed appendix. Cæcum tender. Concretions.	C. gs.	Appendix bound down by adhesions middle two-thirds. Fibrotic	51	2
11	6	No observations made.	Appendix never properly filled. Cæcum not movable. Tender.	C. gs.	Appendix bound down by adhesions. Constricted at proximal end. Fibrotic.	6	11
14	25	—	No evidence of appendix.	C. g.	Appendix under liver and gall-bladder. Very long, œdematous, injected; concretion in tip.	25	14
		Lassitude and General Malaise (Five Cases).					
5	25	No observations made.	Repeated marked tenderness at lower cæcal pole.	—	Long, kinked appendix. Considerable fibrosis.	25	5
12	18	Hyper-activity of duodenum.	Appendix not filling properly. Cæcum tender.	C. gs.	Adhesions. Abnormally long, very injected appendix containing purulent material. General œdematous mucosa. Submucous hæmorrhages.	18	12
3	25	Ptosis. Delay at pylorus. Gastric hypotony.	Appendix not empty four days after meal.	—	Appendix very long, fibrotic. Coiled on itself. Multiple adhesions.	25	3
9	12	Duodenum ? kinked second stage.	Appendix not empty 30 hours after meal. Irregular outline. Tenderness of cæcum.	C. gs.	Large, swollen, very injected appendix. Multiple submucous hæmorrhages.	12	9
13	37	Hyper-activity of duodenum.	Appendix only slightly filled.	—	Multiple adhesions. Appendix opaque and thickened with congested vessels.	37	13
		Lassitude and General Malaise and Upper Abdominal Discomfort (Eight Cases).					
10	27	Stomach hypotonic, dilated.	Appendix not seen.	—	Multiple adhesions around appendix.	27	10
6	20	Some dilatation of stomach, and gastric hypotonia.	Appendix filled, broken up. Cæcum tender.	C. g.	Appendix very œdematous. Multiple petechial hæmorrhages in mucosa. Distal one-third fibrotic.	20	6
4	27	Some ptosis. Moderate pause at pylorus.	Appendix not empty 3½ days after meal.	C. gs.	Long appendix, middle one-third filled with muco-pus. Terminal one-third fibrotic.	27	4
8	22	Duodenum fills at once. Second stage big and somewhat dilated. A little delay at duodenal-jejunal flexure.	Appendix kinked, irregular outline.	—	Appendix kinked at cæcum. Concretion in tip. Fibrosis of terminal one-third.	22	8
7	21	Rapid emptying of stomach.	Very little evidence of appendix.	C. gs.	Adhesions. Long fibrotic appendix filled with thick, almost solid fæces.	21	7
17	35	—	,, ,, ,,	C. gs.	Thickening and fibrosis of distal half of appendix.	35	17
16	16½	To and fro movement in duodenum.	Appendix partly filled. Only slightly movable.	C. gs.	Large, fat appendix, constricted in its centre.	16½	16
18	17	Fair amount of delay at pylorus. Some antiperistalsis is present in second stage of duodenum. Duodenum in second and third stages shows a little dilatation.	Fixed cæcum. Tenderness. Some barium in appendix 30 hours after meal.	C. gs.	Free fluid. Multiple adhesions. Appendix long, injected, œdematous proximal two-thirds, barium in distal one-third from meal given five days earlier.	17	18

C. gs. = calcareous glands.

deferred the operation for three months' medicinal treatment. During this period the patient had four weeks' holiday and continuous nervine and general tonics, particular attention being paid to the alleviation of his constipation. On May 3rd he reported continuous headaches. He slept like a log and awakened heavy-headed with a dry mouth. He had some flatulency. A fortnight later he reported awakening extremely heavy-eyed, with a nasty tangy taste in his mouth, so that he had to drink quantities of water first thing. On June 7th he developed a spread of small angry boils at the nape of the neck. On July 10th he had a further consultation with the surgeon, who agreed to perform appendicectomy.

The appendix was removed on July 31st. It was large, fat, and constricted in its centre. Four months later the patient had no evening fatigue, no headaches, and very slight flatulency. He was full of energy and had no disagreeable taste in his mouth. His general health had improved and he was less constipated.

CASE 18, a lad aged 17 years, felt "sickish" during the afternoon of Nov. 17th, 1930, and went to bed early. He had fitful sleep and awakened about 3 A.M. "feeling like death," and was violently sick. Physical examination showed marked increased resistance over the whole of the right rectus, particularly the upper segment, and increased resistance also in the left rectus. There was no pyrexia. After he had been in bed on milk diet and medicinal treatment for one week the upper two segments of the right rectus were still resistant. He had had occasional twinges of abdominal discomfort, and nausea for a short period on two occasions.

A barium meal on Nov. 26th showed the following abnormalities:—(1) A fair amount of delay at the pylorus. (2) some antiperistalsis in the second stage of the duodenum; (3) the duodenum at the second and third stages shows a little dilatation. 7½ hours after ingestion: (4) the cæcum lies an inch or two below the brim of the true pelvis; appendix not filled. 30 hours after ingestion: (5) some meal still in the appendix; (6) close to the appendix, calcareous glands are visible; (7) tenderness on palpation; (8) appendix is filled, but appears partly hidden by the cæcum and is not freely separated from it. The radiologist further reports: (9) "Cæcum fixed by adhesions caused either by calcareous glands or by the adherent appendix."

Appendicectomy was performed on Dec. 1st. Free fluid was found in the peritoneal cavity, and adhesions bound the cæcum to the posterior abdominal wall. The cæcum and ileum were very injected, and the appendix very œdematous in its proximal two-thirds; its distal one-third contained some barium from the meal given five days previously. There was an area of about 2 in. by ½ in. of inflammatory lymph on the terminal portion of the ileum and parietal peritoneum.

Conclusions.

Perhaps the two cases of outstanding importance to substantiate my claim for the recognition of the "poisoning appendix," and for appreciating the sequelæ suggested earlier, are Cases 13 and 18. Case 13 shows that a non-functioning appendix, as shown by X rays on March 21st, 1929, which had given toxæmic symptoms for two and a half years, had the pathological condition of the cæcal area altered, over a period of eight months, from one of a normal freely movable cæcum to one wherein the cæcum was bound down by adhesions, during which time the only clinical evidence was an intensification of the symptoms. In Case 18 we have definite evidence of physiological reaction in the upper abdominal tract with pathological changes around the appendix—viz., adhesions and calcareous glands—which must have been extant prior to nine days after a subacute attack; as well as operative evidence of the genuineness of the actual subacute attack.

Cases 1, 2, 11, 14, and 15, with histories of pyrexia and vomiting, but without any abnormal physical sign other than that described here for the first time, would be entitled to the convenient diagnosis of "gastric influenza." They suggest that this diagnosis has been made too freely, and that many cases so labelled have been really none other than a subacute exacerbation of the "poisoning appendix." One would be justified in stating that Cases 4, 6, 7, 9, 12, and 18 must inevitably have terminated in acute appendicitis with abscesses.

Cases 4, 6, 12, and 18 have the additional interest of all being in one family. In 1912 a baby belonging to this family died after an operation for appendix abscess and general peritonitis. Three months later another child had an attack of appendicitis. This attack was treated, and subsided, but kept recurring in subacute attacks until recently a chronically diseased appendix was removed. Furthermore, a son in this family had chronic appendicitis and duodenal ulcer; appendicectomy was performed during the period covered by this series. Yet again, the mother of the family and one other daughter also had appendicectomy, making a total of eight operations for appendicectomy within 22 months, four being for definitely chronic appendices, three for poisoning appendices, and one for poisoning appendix with subacute exacerbation.

One cannot overlook the importance of changes in the upper abdominal tract accompanying the non-functioning appendix. Twelve cases furnished this evidence.

Recognition of the "poisoning appendix" should considerably lower the surgical mortality in cases of appendicectomy, for a large percentage of cases would be operated upon before the predominance of peritoneal symptoms. It should also negative the disrespect with which physicians view operations for chronically diseased appendices; a disrespect begotten of the indisputable fact that in a large percentage of cases the patients appear to have derived no benefit at all from the operations. The probable explanation of this absence of beneficial results is that the patients' systems have become so impregnated with the by-products of poisoning from the appendix as to render removal of the cause incapable of obliterating the effects.

Investigations into the histories of patients with acute appendicitis have invariably shown that the patients complained of some phase of general malaise—which on close analysis would evidence toxæmic origin—over a period, either long or short, before the onset of acute symptoms. Acute appendicitis must, therefore, be regarded as a preventable calamity, not as a "bolt from the blue." Transition from physiological utility to pathological decay is slow but sinister, and leaves in its wake:—

(*a*) Symptoms of an absence of well-being, frequently indefinable but here classified as general malaise, and usually ineffectually treated by general tonics.

(*b*) The same general symptoms with upper intestinal tract symptoms superimposed.

(*c*) A physical sign described here for the first time; increased resistance of the upper segment only of the right rectus.

(*d*) Conclusive X ray evidence of the appendix not functioning properly.

Confirmation of the tentative diagnosis depends entirely upon the competence of the radiologist. It is unfortunate that the investigation is not within the reach of all. Were expense not a material factor, many more cases would have been investigated.

With one exception, all the X rays have been taken and reported upon by one radiologist, and with one exception all the operations have been performed by one surgeon, to both of whom I am very gratefully indebted.

STOURBRIDGE CORBETT HOSPITAL.—The Mayor of Stourbridge, Alderman H. E. Palfrey, last week cut the first sod of an extension, and was paid a wage of 1*s.* 1½*d.* for his spade work. The addition will provide 28 extra beds and the corresponding additional accommodation for nurses.

ALBUMINURIA COMPLICATING PREGNANCY.

By G. F. Gibberd, M.S. Lond., F.R.C.S. Eng.,
ASSISTANT OBSTETRIC SURGEON, GUY'S HOSPITAL.

Part II.*—THE TREATMENT.

In seeking a treatment for any disease, we naturally look to the cause for an indication of the therapeutic course to adopt. When we review our ideas on the ætiology of albuminuria of pregnancy, one fact and one only stands out as a certainty. The cause of albuminuria of pregnancy is pregnancy. The cure is therefore the termination of pregnancy, but there are two considerations that limit the immediate and invariable adoption of this method of treatment. In the first place the artificial termination of pregnancy is an operation that entails a definite though small additional risk to the mother on account of the clumsy and uncertain methods we are forced to use. In the second place the interests of the fœtus may sometimes be served better by allowing pregnancy to continue for some time in the presence of a toxæmia.

Thus, while termination of pregnancy must still be the most important method of treatment, there is obviously a place for conservative treatment in certain cases, but when we turn to our theories of the cause of albuminuria of pregnancy for guidance in conservative treatment, we are faced with a number of conflicting and uncertain hypotheses, none of which is strong enough to shoulder the whole of the responsibility for treatment of a disease which is associated with the risks that beset albuminuria. We may, for example, be attracted by the theory that the toxæmia is due essentially to the retention of salts by the body, and therefore adopt a salt-free diet in its treatment; or, on the other hand, we may think it more plausible that the absorption of unusual breakdown products of protein from the alimentary canal is the responsible factor, and therefore favour a protein-free diet. We may think that alimentation has very little to do with the cause of toxæmia, and therefore consider diets of any sort of little importance. If we believe that the toxin is eliminated by the sweat we shall encourage perspiration; if we believe that it is not, we shall do the reverse lest we concentrate the toxin in the body. If we are sceptical as to the very existence of a toxin we shall be indifferent whether a patient sweats or not.

Wherever we turn we find uncertainty and, in the present state of our ignorance with regard to the ætiology of albuminuria of pregnancy, it seems unwise to try to base a treatment upon any theory of the supposed cause. Meanwhile, the demand for an efficient treatment is urgent. The alternative in these circumstances is to base a treatment on our knowledge of the ill-effects that result from the disease, and we have already seen that, apart from eclampsia (in which liver damage plays an important part), the outstanding effects of albuminuria of pregnancy are felt by the kidney: in the most dramatic cases as suppression of urine and acute renal failure; in the less dramatic cases as a permanent damage which we recognise afterwards as a typical chronic nephritis, and in the most insidious cases as an occult nephritis which determines a recurrence of albuminuria with a subsequent pregnancy. A treatment which can ensure the avoidance of eclampsia, and which affords the maximum protection to the kidneys, is therefore the best conservative treatment that we can possibly have at the present time.

It has already been shown that eclampsia can be avoided in cases of albuminuria actually under proper treatment, and the problem therefore resolves itself into devising the best method of protecting the kidneys from the effects of the toxæmia.

Rest.

The methods at our disposal for protecting the kidney from damage by an unknown toxin are for the most part uncertain, but there can be no doubt that physiological rest must be our greatest stand-by. Rest to the kidney can be obtained by ensuring absolute rest to the patient, and this is so obviously the one thing that we can do that perhaps no apology is necessary for pleading for its more conscientious adoption. Nothing less than absolute rest in bed can be considered to give the patient her best chance, and it should be insisted upon in every case from the moment that albuminuria is first discovered. It is sometimes suggested that mild cases of albuminuria need not be treated so seriously, and in order to give this pernicious doctrine a more concrete form the entirely fictitious condition "functional albuminuria of pregnancy" or "simple albuminuria of pregnancy" has been described. These misleading terms imply that the condition is without danger to the mother or fœtus—an implication that is entirely untrue. Patients who, by the mildness of their symptoms, can be dubbed "simple albuminuria" may quite well develop a severe toxæmia, or even eclampsia, at a later stage if improperly treated; furthermore, I have in a previous paper [1] shown that a "simple albuminuria" may be followed in a subsequent pregnancy by a recurrence of the albuminuria, which can be regarded as still further evidence that this "simple albuminuria," so far from being harmless, was actually followed by an occult nephritis. The term "simple albuminuria" cannot possibly be justified on pathological grounds, and since it is dangerously misleading on clinical grounds it should be abolished. The difficulties of classification of albuminuria complicating pregnancy are great enough, and so far there is no satisfactory pathological grouping available, but, using a classification merely as a guide to treatment, we shall avoid accidents only if we look upon all cases of albuminuria complicating pregnancy as due either to toxæmia or to pre-existing renal disease, or indeed to both these causes acting together. Thus all cases need serious treatment, and this includes rest in bed from the earliest possible moment.

The question of how long the patient should be kept in bed can be answered very simply: until she is cured clinically. This is the least time we should allow a case of acute nephritis in which we hoped to achieve a permanent recovery, and it is therefore the least we can recommend for a pregnant woman in whom the renal condition is seriously disturbed and in whom we hope to avoid the immediate catastrophe of complete renal failure and the more remote danger of permanent renal damage. The patient is to be considered clinically cured when she is free from all signs and symptoms, the last of these to disappear being usually albuminuria, though occasionally a raised blood pressure may persist after the urine has become albumin-free.

Contrary to a very widespread belief, it is really uncommon for an albuminuria of pregnancy to clear up entirely before delivery. In a previous paper [1] I showed that of 111 consecutive cases of albuminuria complicating pregnancy, in only 11 (10 per cent.)

* Part I. appeared last week.

did the albuminuria disappear before delivery, in spite of active treatment.

It is difficult to understand how the widespread belief that albuminuria under treatment commonly clears up before the birth of the child has arisen, and I can only think that it is based upon careless observations, in which the albuminuria accompanying a transitory pyuria has been mistaken for an essential albuminuria. No case of albuminuria should be accepted unless a microscopical examination of the urine has been made for pus cells. It is sometimes difficult to decide how much albumin we may attribute to the presence of pus but this difficulty is uncommon, since a consideration of all the accompanying signs and symptoms will usually point to the correct diagnosis of either albuminuria of pregnancy or pyelitis or both. So long as the possible source of error is constantly borne in mind, error is unlikely; but immediately it is ignored mistakes in diagnosis and fantastic beliefs in "simple albuminuria" and "frequent cures" before delivery of the patient will inevitably result.

It is clear, therefore, that the majority of patients suffering from albuminuria must stay in bed from the very first time that albumin is discovered until after delivery. If we examine our treatment critically we cannot but be ashamed of our carelessness of end-results. That this carelessness is universal is shown by the fact that it is demonstrated in the annual reports of many of the big midwifery institutions of Great Britain. Under the section of albuminuria some of these reports have a heading showing the result of the urine test at the time the patient leaves hospital. In many cases the space is left blank (which possibly means that the urine was not tested), but where a record is made we can draw definite conclusions. Table V. is made up from the latest available annual reports of five of the hospitals where the necessary information is published.

TABLE V.

Total cases of albuminuria.	Result of urine test at time of discharge.		
	No record.	Alb. present.	No alb. present.
236	59	118	59

These hospitals have been chosen at random as representing the best type of treatment at present practised in Great Britain. It is seen, therefore, that in cases where a record is available nearly 70 per cent. of the patients are discharged from hospital before the albuminuria has cleared up. Some of these, no doubt, are suffering from chronic nephritis, but this can account only for relatively few cases. If the late results of albuminuria were satisfactory there might be some justification for allowing a patient with an acute renal disease to get up before all signs of disease had disappeared; but as in fact the present-day results are not satisfactory, surely there is reason to make an extra effort to improve them.

It is impossible to give any comparative figures showing the late results in patients who have, and have not, been allowed to leave bed before the albuminuria has disappeared, since it is too soon to have collected a large enough series of the latter. In the light of our present knowledge, the least we can do is to treat albuminuria of pregnancy with the care that we should bestow upon a case of acute nephritis. Except where there is good reason to believe that a chronic nephritis antedated the pregnancy, no lying-in mother who has suffered from albuminuria should be allowed to leave her bed until her albuminuria has entirely cleared up. This may be a counsel of perfection, and economic pressure amongst hospital patients may be a serious difficulty, but if we allow a patient to get up before this time, at least we must not delude ourselves that she is having the best treatment. The value of this rest is probably mainly that it reduces the patient's endogenous protein metabolism to a minimum, and therefore reduces the work that the damaged kidney has to do in excreting nitrogenous waste products.

Diet.

The importance of diet in the treatment of albuminuria has been stressed frequently enough, but unfortunately there is no uniformity of opinion as to the best diet to adopt, mainly because its value is differently interpreted by various observers. Admitting, as we must, our ignorance of the ætiology of "toxæmia of pregnancy," it seems unwise to adopt this or that diet because of some supposed influence in the production of an unknown toxin. The importance of renal disease, even though it be secondary in these cases, is undoubted, and since protection of renal function is an aim that can be furthered by dietetic measures it seems rational to adopt a diet which entails the least amount of work on the part of the kidneys.

This consideration has led me to adopt a diet that is as nearly as possible protein-free, and although I do not suggest that there is anything new in this type of diet, yet I would stress again that its adoption is based solely upon a recognition of the most important result of toxæmia of pregnancy—i.e., kidney damage. The diet is in no way dependent upon the possible cause of the toxæmia, and its "rationale" is uninfluenced by mere speculations into the ætiology of the disease.

A full mixed diet entails extra work for the kidneys for two reasons: first, on account of its specific dynamic action, it causes an increase in basal metabolism (especially marked where proteins figure largely in the diet) and this entails an increased excretion of nitrogen and salts; furthermore, in the case of nitrogenous foods, excess over and above the minimum necessary to replace the results of endogenous protein katabolism must be excreted quantitatively by the kidney. By diminishing the diet we can therefore diminish the work thrown upon the kidney, but this principle cannot be carried to the extreme of complete starvation, since in this condition the patient is forced to live on her own tissues to supply the needs for her basal metabolism, and thus immediately becomes carnivorous. It is therefore wrong in severe cases of albuminuria to enforce complete starvation. It should be our aim to supply as nearly as possible the basal calorie requirements of the body in a form of food which does not lead to any increase in work by the kidney. Such a food is sugar. A further advantage in adopting a sugar diet, as opposed to complete starvation, is that it avoids completely the onset of ketosis, a condition which is probably dangerous and certainly most distressing to a patient already severely ill with albuminuria of pregnancy.

Glucose is the sugar of choice, since it is less sweet than cane sugar, and for administration by mouth commercial "liquid glucose" (containing about 60 per cent. of carbohydrate) is perfectly satisfactory. A solution of 4 oz. of liquid glucose in a pint of water flavoured with lemon juice makes a lemonade which if not a pleasant drink, is at least tolerable; and it

has the advantage that if four or five pints a day are consumed the patient receives about 1000 calories without imposing any extra work on her kidneys. Much less than this is, of course, sufficient to prevent a ketosis, but with this amount of glucose a tolerant patient can be starved of all other food for several days continuously. In practice it is found that alimentary glycosuria does not arise if the "lemonade" is distributed fairly evenly throughout the day. This is the minimum diet for the treatment of albuminuria, and it can be augmented by adding solid carbohydrates, then fats, and—in order to make the diet less uninteresting—a small amount of protein may be allowed as a concession, but the aim is to restrict diet as nearly as possible to carbohydrates.

The following standard diets are in use at Guy's Hospital, and they are given in detail to illustrate that a fairly attractive low protein diet can be achieved in hospital practice.

STAGE 1.—About 1000 calories. Lemonade and glucose four to five pints (glucose 4 oz. to the pint); oranges, 4.

STAGE 2.—About 1500 calories. Fluids not less than five pints (including glucose lemonade); oranges or apples, 4.
Breakfast.—Toast, 2 oz.; butter, ½ oz.; marmalade, 1 oz.; tea.
Lunch.—Cocoa or coffee.
Dinner.—Sandwiches (marmite, cress or lettuce, &c., 2 oz.); pudding, 4 oz.; jam, 1 oz.
Tea.—Bread, 2 oz.; butter, ½ oz.; jam, ½ oz.; tea.
Supper.—Biscuits, 1 oz.; cocoa.

STAGE 3.—About 1800 calories. Fluids and fruit as Stage 2.
Breakfast.—Toast, 2 oz.; marmalade, 1 oz.; butter, ½ oz.; tea.
Lunch.—Cocoa or coffee.
Dinner.—Sandwiches, 4 oz.; vegetables, ad. lib.; pudding, 4 oz.; jam, 1 oz.
Tea.—Bread, 2 oz.; sandwiches, 1 oz.; tea.
Supper.—Biscuits or sandwiches, 1 oz.; cocoa.

STAGE 4.—About 2200 calories. As Stage 3, with daily addition of half pint of milk; fish, 4 oz.; egg, 1.

In Stage 2 and Stage 3 milk is restricted to that necessary for beverages, since the protein content of milk is high, and it is allowed in these small amounts only in order to make the diet less dull for a patient who may have to confine herself to it for several weeks on end. Every patient, when first admitted to hospital, is put on Stage 1 diet for the first 24 hours in order to obtain an estimate of the blood pressure and albumin content of the urine under standard conditions. The subsequent diet depends upon a number of considerations but, generally, speaking, she remains on Stage 1 diet as long as her blood pressure remains high (above 150 mm.) or the amount of albumin in the urine is great (above 2 parts per 1000). Improvement beyond this stage is generally looked upon as cause for promotion to Stage 2 diet, and the patient then continues with this until she is delivered, except in the rare instances where the albuminuria clears up entirely before delivery, when she may proceed to Stage 3 diet.

Stage 3 diet is, as a rule, reserved for patients immediately after delivery, in whom it is still necessary to curtail the protein but in whom a fairly liberal diet is required to encourage lactation. Stage 4 diet is intended for patients who have recovered completely after delivery. When the last trace of albumin has disappeared from the urine the patient is allowed to get up and to enjoy this augmented diet. She is advised to keep to this as a rule for a further four to eight weeks, after which she is free from all restriction.

Elimination of Toxin.

While attempts to relieve the kidney of any excess of work are undoubtedly rational, we are on less certain ground when we attempt to "eliminate toxins" in cases of albuminuria. The very existence of a toxin is still unproven, and there is no direct evidence of how it is excreted. In spite of the absence of experimental proof, however, the clinical value of purgatives is well established, and in all cases it is important to secure one or two loose evacuations of the bowels daily. This is best achieved by saline purgatives, and magnesium sulphate in doses of 2 drachms should be given as required; usually once daily is sufficient. The one disadvantage of this régime is that after some time (four to eight days) the patient may become uncomfortable from abdominal distension due to the prolonged continual administration of magnesium sulphate. This can be overcome by giving 48 hours' rest from the saline aperient and substituting for it small doses of cascara sagrada, after which the saline can be continued for a further period.

The advisability of inducing diaphoresis has been questioned, since it is held by some that the loss of fluid in this way merely concentrates the toxins in the body. As there is no experimental evidence to help us we are compelled to rely on clinical impressions for guidance, and it has been repeatedly observed that in cases of severe toxæmia profuse sweating is usually a good sign. For this reason, in severe cases of albuminuria where there is threatened suppression of urine, it is advisable to induce sweating by means of hot blankets, or, if available, by an "electric cradle," but it is not necessary to make use of diaphoresis in less severe cases.

The possible excretion of toxins by way of the kidneys calls for the administration of large amounts of fluid, and in any case, even if the intake of fluid is not followed by a commensurate diuresis, it must result in a dilution of toxins in the body. Clinically, the result of ingestion of large amounts of fluid are certainly good. For this reason the patient should be encouraged to drink at least five pints a day. On Stage 1 diet this will necessitate her taking a pint of water in addition to her four pints of "glucose lemonade." On the other diets she may choose her fluid from water, barley-water, lemonade, and other similar beverages.

Drugs.

With the possible exception of alkalis, there are no drugs of any particular value in the treatment of albuminuria, apart from those necessary for the production of catharsis. Osman and Close,[2] in their general study of renal disease, have drawn attention to the value of large doses of alkalis in the treatment and prevention of nephritis, and have suggested the use, inter alia, of alkalis in the treatment and prevention of albuminuria of pregnancy. As is now well known, Osman's "alkali treatment" is a very different thing from giving a fixed dose of potassium citrate to a patient three times a day, and its application involves careful and constant observation on the pH of the urine, with occasional control estimations of the bicarbonate reserve of the blood. In his view, the employment of inadequate doses of alkali is useless. While the results of Osman's investigations into the value of alkalis in albuminuria of pregnancy are as yet incomplete, it is too soon to attempt to form an opinion on this line of treatment. We must wait until sufficient evidence has been obtained to warrant either its adoption or its omission from the methods at our disposal. Irresponsible dabbling with alkalis can lead to no good.

Induction of Labour.

When conservative methods have failed in the treatment of albuminuria associated with pregnancy,

there is general uniformity of opinion that induction of premature labour should be adopted as a radical measure. Much difference of opinion exists as to when conservative treatment is to be considered a failure. In the light of our knowledge of the remote effects of this disease on the kidneys, we must look upon the conservative treatment as a failure if eclampsia supervenes, if chronic nephritis results, and also if the patient develops an albuminuria with a subsequent pregnancy in spite of being apparently healthy in the interval. Furthermore, if the fœtus dies in utero, conservative treatment has obviously failed in its object.

Unfortunately, induction of labour does not offer a solution to the difficulties in every case, but it is a measure which deserves a wider application than it has been given in the past. It was formerly considered valuable only in so far as it might prevent the onset of eclampsia, but now that the other sequelæ of albuminuria are recognised, there is good reason to expect that improvement in the late results of pregnancy toxæmia will follow the wider use of induction of premature labour in certain cases.

Attention has been drawn already to the fact that the incidence of recurrent albuminuria can to some extent be controlled by early induction of labour in the first toxæmic pregnancy, and also that the incidence of chronic nephritis amongst previously healthy women can be appreciably diminished by the same means. So far as the welfare of the child is concerned it has been shown that maceration owing to delay in induction is in fact a greater danger than the risk of death from prematurity resulting from induction.

Armed with these facts, we can proceed to consider general principles as to the indications for induction of premature labour in cases of albuminuria. These indications can never become hard-and-fast rules, since the relative importance placed upon the value of the infant and the risk to the mother must vary with each individual patient, but they are to be taken as a working basis, to be modified in special circumstances. They can be set out as follows.

Labour should be induced:

1. In any severe toxæmia (blood pressure greater than 170 mm.) which does not respond within 2 or 3 days to full treatment—i.e., rest in bed on Stage 1 diet.

2. In any toxæmia of moderate severity (blood pressure 150 mm.) when progressive improvement ceases to take place. It is not sufficient that the blood pressure and albumin content of the urine should remain constant from day to day to justify the withholding of induction.

3. In any toxæmia, no matter how mild, that has lasted (as proved by the persistence of albuminuria) more than two weeks.

4. In patients known to have a chronic nephritis, as soon as the patient is first seen.

5. In any case where a previous pregnancy has resulted in a macerated fœtus, as soon as the fœtus seems big enough (32 to 34 weeks) to stand a reasonable chance of survival.

It must be emphasised again that these indications are to be modified in special cases, but they are set out dogmatically as a standard that we should try to attain for the sake of the mother. It may, in special circumstances, be justified to allow her to take risks of permanent renal damage for the sake of a viable fœtus, but let us not delude ourselves about the issue. Delay in induction may be necessary for the sake of the fœtus in some cases, but it is the mother who pays for this advantage. That she may pay willingly is no reason for belittling the cost.

Summary.

In view of the unsatisfactory results that are liable to follow upon albuminuria complicating pregnancy, the necessity for more whole-hearted treatment has been stressed. The futility of basing a treatment upon mere speculations as to the ætiology of the disease has been discussed, and a treatment the rationale of which depends upon what we know of the late results has been outlined. This treatment aims primarily at protecting the kidneys against the "toxæmia," and it has as its basis, rest, protein-free diet, and early induction of labour. These three measures are discussed at length, and although each is a well-recognised method of treatment, a plea is made for their more conscientious application, in an attempt to improve the late results which are at present so unsatisfactory.

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THE ANTIRACHITIC VALUE OF IRRADIATED YEAST.

By Stanislaw K. Kon, Ph.D.

(*From the Biochemical Department, State School of Hygiene, Warsaw.*)

The results of the administration of irradiated yeast to rachitic children have been reported in a previous communication.[1] The present paper deals with the evaluation of the antirachitic potency of irradiated yeast by means of the rat test.

It is well known that, owing to the easy storage of vitamin D, unknown variable amounts of this factor are present in the body of young rats when placed on a rachitogenic diet, and that the time necessary for the production of rickets is a function of the maternal diet. Similar difficulties are encountered in the case of vitamin A. To obviate them Nelson[2] has recently suggested a simple and ingenious procedure. He found that, when mother and young were transferred to a vitamin-A-free diet when the young were 16 to 18 days old, the onset of symptoms of vitamin A deficiency in the young seemed to be independent of the amount of vitamin A given to the mother during the entire period of lactation. Some difficulties having been encountered in our laboratory in the production of rickets in young rats when transferred directly from the stock diet* to the rachitogenic ration, the method of Nelson was resorted to with excellent results. On the 16th day of lactation mother and young were changed from the stock diet to a similar diet from which the butter had been omitted; the young were weaned when weighing from 55 to 65 g. and placed on the 2965 rachitogenic diet of Steenbock. In every case line test rickets were produced with great constancy in the course of three weeks.†

The irradiated yeast was prepared under exactly the same conditions as previously described.‡ For testing, graded amounts of the yeast were weighed out, intimately mixed with 50 g. of diet 2965 and fed

* The diet was a modification of Steenbock's stock diet[3] and had the following composition: whole ground rye 70, linseed cake 15, butter 5, dried ox liver 3, calcium carbonate 0·5, sodium chloride 0·5. The diet was supplemented with 10 per cent. by weight of dried whole milk and fresh carrots.

† According to the "tests" of the Pharm. Soc. of Gt. Brit.[4] butter should be omitted from the diet of mothers whose young are to be used for vitamin D tests.

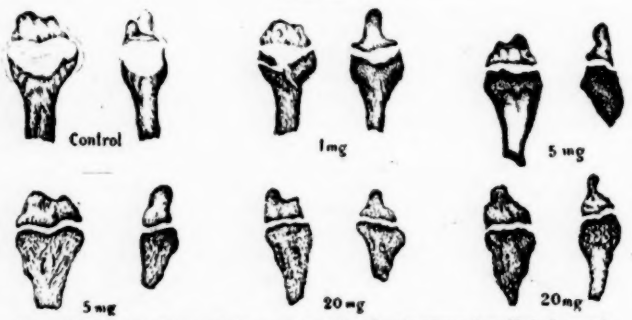
‡ By inadvertance the distance from the source of light was not given in the first paper. The distance was 50 cm.

to rachitic rats which were kept in separate cages. When completely consumed, the mixture was followed by the untreated 2965 ration, and after ten days the rats were killed, and the radii and ulnæ examined by the line test technique.§ Amounts from 1 to 20 mg. of irradiated yeast were tested and the results are shown in Figs. 1 and 2. As appears from the drawings, a total dose of 1 mg. (or 0·1 mg. daily) is sufficient to produce a narrow line of calcification, and is therefore equivalent to one rat unit as defined by Steenbock. This is in perfect agreement with the results of Steenbock,[5] a result certainly striking, especially as the yeast used in Madison and Warsaw respectively was obtained from quite different sources, and the conditions of irradiation were not exactly the same in the two places.

Stability of Vitamin D in Irradiated Yeast.

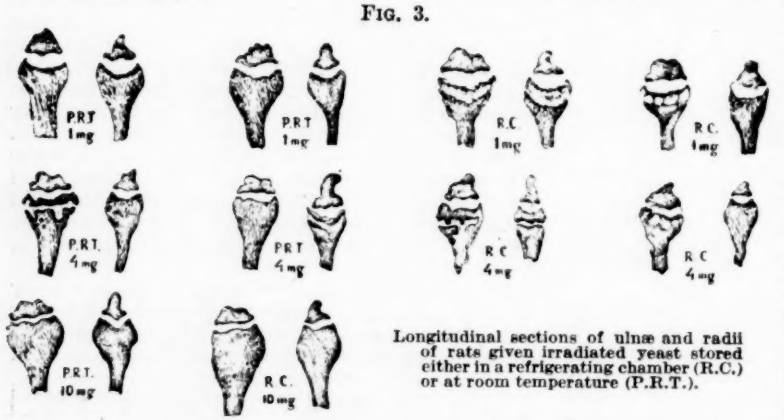
A batch of yeast irradiated under standard conditions on Nov. 19th, 1929, was divided into two parts: one was placed in a glass-stoppered bottle in a cold store at a temperature of −2° C., the other, wrapped in paper, was kept at room temperature in the laboratory. After six months (on May 21st, 1930) the two preparations were tested for their vitamin D content. The results are given in Fig. 3. It is evident that no difference can be noticed between the activity of the two batches. There is no separate line of calcification in the case of rats given 1 mg. of P.R.T. yeast—but the width of the metaphysis approximately corresponds with a "narrow line" test. A comparison with Figs. 1 and 2 shows that hardly any loss of activity took place in the course of six months, 1 mg. of irradiated yeast still giving after this time a narrow line of calcification or a medium metaphysis.

FIG. 2.



Longitudinal sections of ulnæ and radii of rats given irradiated yeast.

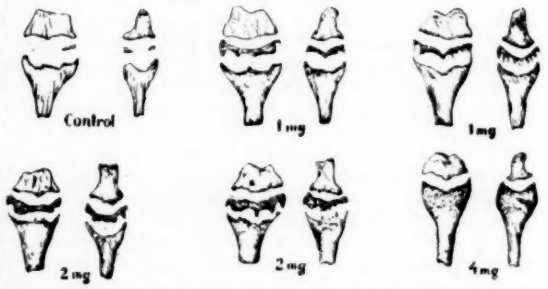
FIG. 3.



Longitudinal sections of ulnæ and radii of rats given irradiated yeast stored either in a refrigerating chamber (R.C.) or at room temperature (P.R.T.).

The batch kept at room temperature was retested after another four months had elapsed (ten months after irradiation) on Sept. 23rd, 1930, and no noticeable deterioration was observed, 1 mg. of the preparation still giving a narrow line. These drawings are omitted in order to save space.

FIG. 1.



Drawings of longitudinal sections of ulnæ and radii (treated with silver nitrate and exposed to light) of rats given irradiated yeast.

The results indicate that irradiated yeast retains for a long time its antirachitic properties and that it can be kept at ordinary temperature and exposure to air. This is in contradiction to the results of Kirsch,[6] who found that irradiated yeast rapidly deteriorated. He must have been working, however, with an inadequate preparation, for he had to administer very high doses (0·5 to 1 g. daily) in order to obtain positive results.

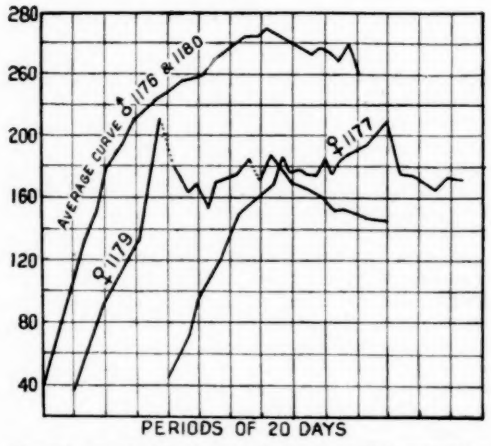
Problem of Overdosage.

The question whether untoward symptoms observed in infants and in experimental animals receiving an overdosage of irradiated substances is due to hypervitaminosis or is caused by a toxic factor distinct from the vitamin has not yet been answered with certainty.[7 8 9] It is obvious that the irradiation of such a complex substance as yeast, in the presence of oxygen and with polychromatic ultra-violet light, leads to the formation of a variety of products other than vitamin D. On the other hand, some observers have voiced the opinion that non-irradiated ergosterol is per se harmful.[10] Should this be true, it might have an important bearing on the use of yeast in general and of irradiated yeast in particular, for there is no doubt that a large percentage of unchanged ergosterol is present in irradiated yeast. It was thought highly necessary to determine experimentally whether and what overdosage of irradiated yeast would be harmful to the rat.

§ The author had the privilege of spending six months in the laboratory of Prof. Steenbock and of acquiring the technique of the line test, as carried out there.

Twelve rats from two litters were therefore distributed into three batches, each batch consisting of two males and two females, with the exception of batch 1, containing three males and one female. The first batch was placed on our usual stock diet (diet 33), the second was given the

FIG. 4.



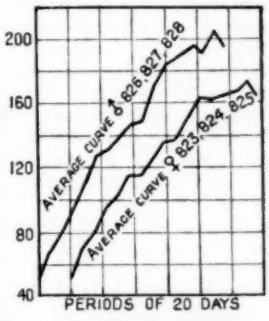
Growth curves of first generation rats on diet containing irradiated yeast.

stock diet plus an addition of 10 per cent. of non-irradiated yeast (diet 57), while the third batch was given the stock diet with an addition of 10 per cent. of irradiated yeast (diet 58). In each batch the males and females were kept together; pregnant does were isolated; in each litter the young after birth were reduced to six, weaned in the customary way when three weeks old and transferred, males and females together, to separate cages, where they were offered the parental diet. The experiment lasted 6½ months (200 days). During this time one female on diet 57 (non-irradiated yeast) had two litters but did not suckle them‖; the other female had four litters (35 young) of which three were suckled after reduction of the litters to a maximum of six, and seventeen young were weaned. On diet 58 (irradiated yeast) one female had two litters, one of nine young and one of two; after reduction of the former all eight were weaned. The other female had no litter, but normal fœtuses were found in utero at autopsy at the close of the experiment.

‖ Failures in lactation occurred also in stock colony females. This phenomenon has been discussed in a separate communication.[11]

The growth curves are given in Figs. 4 and 5 and it can be seen that while the animals on diet 57 grew steadily, those on diet 58 reached a plateau in the later part of the experiment, and then declined slowly. The differences are, if anything, more marked in the second generation, as shown by the growth curves of the first litters of does 1171 (diet 57) and 1179 (diet 58), Figs. 6 and 7. The better growth of the rats receiving non-irradiated yeast is clearly evident.¶

FIG. 7.



Growth curves of second generation rats on diet containing irradiated yeast.

On inspection at the close of the experiment they were found to be strong and lively animals, with silky fur and excellent muscular tonus, while the rats receiving irradiated yeast looked rather old for their age, felt flabby, the coats were not good, and the nose, front paws and the fur were to a greater or lesser degree soiled with blood. All three second generation females on the non-irradiated yeast (first litter of doe 1171) produced litters, and two weaned them successfully, while none of the second generation females on the irradiated yeast bore young. The reason for this failure is not clear, as motile sperm was found at autopsy in all the males and, by means of vaginal smears, ovulation was shown to occur in the females.

In an elaborate research Bills and Wirick[12] have reported definite injury in long-time experiments in rats receiving 4000 times the minimum antirachitic level of irradiated ergosterol, and they state that "All the females failed to reproduce following the

FIG. 5.

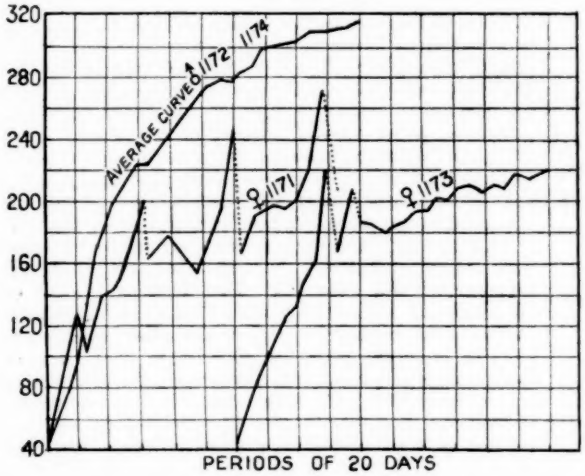
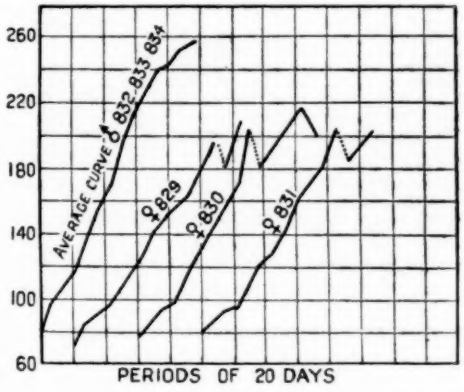


FIG. 6.



Growth curves of first generation rats (Fig. 5) and second generation rats (Fig. 6) on diet containing non-irradiated yeast.

¶ Curves for other second-generation rats are not given for economy of space. A second litter of five of doe 1171, born 2½ months before the termination of the experiment, grew at a perfectly normal rate, and the rats were apparently quite healthy and strong when disposed of. A third litter of six was weaned on the day the experiment was discontinued and averaged 46½ g. at that time. The second litter of doe 1179, consisting of two females, was unfortunately used for another experiment immediately after weaning.

third mating." A similar reproductive failure of rats receiving 50,000 times the normal daily dose of irradiated ergosterol, in addition to the Bills' modification of the Steenbock stock diet, was reported by Light, Miller and Frey.[13]

Third generation young from the non-irradiated yeast group were apparently perfectly normal at weaning, when they were killed, it being necessary to discontinue the experiment. As mentioned, third generation young were not produced in the irradiated yeast group. The average daily food intake being estimated at 15 g. every rat must have consumed about 1·5 g. of yeast daily, corresponding, for the irradiated yeast animals, to an intake about 15,000 times larger than the minimal daily dose necessary for the production of a positive line test in a rachitic rat. The toxic effects of such an overdose are quite definite, but they are slight when compared with the dramatic course of massive overdosage with irradiated ergosterol. It seems that it may safely be concluded that irradiated yeast is not more toxic for rats, unit for unit, than irradiated ergosterol.

The results obtained do not seem to indicate that non-irradiated ergosterol, at least in the concentrations used in the present work, has any toxic properties. In fact rats receiving the addition of 10 per cent. of non-irradiated yeast did just as well as their mates on the stock ration alone. This observation is at variance with the findings of Jundell,[10] but certainly more work will have to be done on this important question before it is definitely settled.

Summary.

Yeast irradiated under specified conditions was found to contain one rat unit (Steenbock) in 1 mg. The preparation is stable and retains its potency for at least ten months at room temperature. A toxic effect could be elicited in rats by the prolonged administration of a modified Steenbock stock diet containing 10 per cent. by weight of irradiated yeast.

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HIGHER PAYMENTS TO CONTRIBUTORY SCHEMES.—The board of delegates of the Birmingham Hospital Saturday Fund has unanimously agreed to raise the weekly contribution from 2*d.* to 3*d.*, after a proposal to graduate the payment according to income had been narrowly defeated.—The Sheffield and District Association of Hospital Contributors has also decided "to make an extra voluntary contribution at a flat rate of 1*d.* per week for an agreed period."

CORBRIDGE MATERNITY HOSPITAL.—Last week Lady Victoria Percy opened a maternity hospital at Corbridge, provided by the Northumberland County Nursing Association. The hospital consists of a considerably enlarged private house which has been used as a nurses' home by the Tynedale district nurses. In addition to a public ward there is a private ward and accommodation for private nurses. One of the wards is a memorial to the late Dr. Daniel Jackson, of Corbridge.

INSULIN AND PRESERVATIVE.

NOTE ON THE EFFECT OF INSULIN SOLUTIONS OF VARYING REACTION ON THE VIABILITY OF STAPHYLOCOCCI.

BY PERCIVAL HARTLEY, *M.C.*, D.SC.
(*From the National Institute for Medical Research.*)

THE question of the addition of preservatives to insulin preparations dispensed in certain types of containers has been discussed recently in the correspondence columns of THE LANCET.[1 2 3 4] It is not proposed to enter into all the points raised in this correspondence; some of the writers assert definitely that the frequent daily injections of small amounts of phenolic preservative is harmful, while others are less positive, and urge, rather, that certain aspects of the question should receive further consideration and investigation. In view of recent experiences with antiseptic-free preparations of other therapeutic substances, it appeared to be of some importance to ascertain whether insulin solutions without such preservative can serve as a culture medium for micro-organisms accidentally introduced, and the importance of the question is increased by the fact that a great deal of the insulin used is administered by the patient himself. Is it possible for the diabetic patient, by any accident likely to occur in practice, to infect his phial of insulin at one withdrawal of a dose and, if he does so, will there be a danger of his injecting living micro-organisms in a later dose from the same bottle? It seemed desirable to investigate, firstly, whether micro-organisms can survive or multiply in the solutions of insulin as supplied; and, secondly, if these solutions are themselves germicidal, whether it is possible by accidental introduction of a small quantity of alkaline fluid to make the solution a culture medium for micro-organisms.

EFFECT OF REACTION ON BACTERIAL GROWTH.

It is claimed that the acidity of insulin solutions is a sufficient protection against infection, and this claim, together with the experience gained in this Institute, especially in the period immediately following the introduction of insulin, suggested that this particular point merited further investigation. During recent years samples of insulin have been returned to this Institute with a complaint that the product has become opalescent or that a precipitate has appeared in the fluid. Examination showed that the opalescence or precipitation was due, not to infection with micro-organisms, but to the fact that the reaction of the fluid had been changed so as to approach the isoelectric point of the insulin. Manufacturers of insulin have had a similar experience, and it is very probable that the cause of the opalescence or precipitation was the use of syringes which had been sterilised in alkaline solutions. Leyton and Poulton,[1] having in mind this possibility, suggest that an additional precaution might take the form of an instruction to the patient to the effect that, if the insulin does not look like clear water, it should not be used. The adoption of this proposal would exclude from further use some of the solutions which have been shown in these experiments to be capable of supporting the growth of staphylococci; but it has been found also that solutions of insulin which have been made sufficiently alkaline to overshoot the isoelectric point, so that they remain water-clear, certainly permit the survival, and possibly support the growth, of staphylococci.

Through the courtesy of three of the British manufacturers, samples of insulin have been supplied which are similar in all respects to their ordinary batches, with the single exception that the usual phenolic preservative had not been added. These samples are referred to below as B1 (32 units per c.cm.), B2 (20 units per c.cm.), and B3 (20 units per c.cm.). A preparation of preservative-free insulin made by a foreign manufacturer has also been available, and this is referred to as L (40 units per c.cm.); and one further sample for study, kindly supplied by this foreign manufacturer, was a preparation of the same insulin, L, containing 0·3 per cent. of tricresol.

As test organism a strain of *Staphylococcus albus* has been used. This has been subcultured daily into 10 c.cm. quantities of nutrient broth, and 24-hour old cultures have been used throughout the work. The dilutions of the culture have been made in nutrient broth, and in all the experiments the cocci inoculated into each insulin sample (5 c.cm. quantities of insulin solution being used throughout) were contained in 25 c.mm. of the appropriate dilution. In each experiment the number of cocci inoculated was determined.

For the purpose of varying the reaction of the 5 c.cm. quantities of insulin solution under test, a sodium carbonate solution was prepared by dissolving 0·84 g. of sodium bicarbonate in 100 c.cm. of distilled water, the solution being distributed, in 5 c.cm. quantities, into test-tubes, which were then autoclaved. It was found that the addition of 0·2 c.cm. of this solution to 5 c.cm. of the insulin preparations used brought the reaction of the fluid to about pH 8.

RESULTS OF THREE EXPERIMENTS.

EXPT. 1.—From each of three of the insulin solutions, B1, B2, and L, duplicate 5 c.cm. quantities of insulin were measured out, and to one of each pair of tubes 0·2 c.cm. of the alkaline solution were added. The precipitate which first formed redissolved. To each of the six tubes 920 staphylococci were added, and the mixtures allowed to stand at room temperature for 48 hours. At the end of 24 hours, and again at the end of 48 hours, the number of viable cocci present in each tube, and the pH, were determined. The reaction of insulin solutions as prepared for use is between pH 3–4. The addition of 25 c.mm. of broth used for the inoculum has a slight effect on the reaction, the pH of all the solutions tested being about 4, or slightly more alkaline (Table I.).

TABLE I.

Preservative-free insulin.	Alkali solution added c.cm.	pH.	Number of cocci present after—	
			24 hours.	48 hours.
B1	Nil.	8	0	0
	0·2		0	0
B2	Nil.	7·8	0	0
	0·2		800	1200
L	Nil.	7·8	0	0
	0·2		14,000	Unc.

Unc. = uncountable.

EXPT. 2.—This was carried out in the same way as the previous experiment, except that: (1) The insulin-cocci mixtures were incubated at 37° C. for 24 hours and then allowed to stand at room temperature for a second 24 hours. (2) Gradually increasing quantities of the alkali solution were added to the 5 c.cm. samples of preservative-free insulins, B1 and L. The amount of material of preservative-free insulins B2 and B3 available was only sufficient for the single test quoted. (3) The number of cocci inoculated into each sample was 200 (Table II.).

EXPT. 3.—In this experiment the preservative-free insulin L and insulin L containing 0·3 per cent. tricresol were compared. Each tube was inoculated with 2200 cocci, and the mixtures were kept at room temperature throughout the 48 hours of the experiment (Table III.).

TABLE II.

Preservative-free insulin.	Volume of alkali solution added c.cm.	Appearance of solution.	pH.	Number of cocci present after—	
				24 hours at 37° C.	Second 24 hours at room temp.
B1	Nil.	Clear.	7	0	0
	0·1	M. op.		19,200	84,000
	0·2	Ft. op.	8	600	1000
	0·3	Clear.	8·5	0	0*
	0·4	,,	8·8	0	0*
B2	Nil.	,,	7·8	0	0
	0·2	,,		4,600	400
B3	Nil.	,,	8·2	0	0
	0·2	,,		5,000	1,400
L	Nil.	,,	6·5	0	0
	0·1	H. prec.		Unc.	—
	0·2	Ft. op.	7·8	,,	—
	0·3	Clear.	8·3	14,800	1,600
	0·4	,,	8·8	1,400	0*

M. and Ft. op. = markedly or faintly opalescent; H. prec. = heavy precipitate.

* After 48 hours, 0·1 c.cm. of these solutions were inoculated into 10 c.cm. quantities of nutrient broth; no growth occurred after three days' incubation at 37° C.

TABLE III.

Insulin L.	Volume of alkali solution added c.cm.	Appearance of solution.	pH.	Number of cocci present after—	
				24 hours.	48 hours.
I.	Nil.	Clear.	4·5	0	0
	0·05	Op.		0	0
	0·1	H. prec.	6	22,800	200,000†
	0·2	Very ft. op.	8	4,500	8,500
	0·3	Clear.	8·5	800	0*
	0·4	,,	8·8	0	0*
	0·5	,,	9·2	0	0*
II.	Nil.	,,	4·5	0	0
	0·05	Ft. op.		0	0
	0·1	H. prec.	6·3	0	0
	0·2	Very ft. op.	8	0	0
	0·3	Clear.	8·5	0	0
	0·4	,,	8·8	0	0
	0·5	,,	9·2	0	0

* See Table II. † Over.

I. = Preservative-free. II. = Containing 0·3 per cent. tricresol.

COMMENT.

Leyton and Poulton[1] raise the question as to whether an ordinary solution of insulin is a suitable culture medium, and these experiments show that, with the number of cocci used, such solutions are germicidal. In this respect the results are in complete agreement with those of Payne and Signy,[3] who showed that *B. coli* and *Staphylococcus aureus* failed to survive in insulin solutions of the usual acidity. The result is in accordance with expectation and with clinical experience; it is clear that, provided the normal acidity of insulin solutions is maintained, the danger of infection from casually introduced micro-organisms is not serious. It is shown in Experiment 3 that, even if the insulin solution becomes inadvertently neutralised, the presence of the usual proportion of phenolic preservative suffices to kill cocci which may be accidentally introduced.

If the normal acidity of an insulin solution containing no preservative is even slightly reduced, however, staphylococci are not killed by it, and under certain conditions considerable growth may occur. The range of reactions to the alkaline side of pH 6, in which multiplication was observed, differed in the case of different insulins, presumably on account of slight differences in their content of substances, other than insulin itself, which are capable of supporting

bacterial growth. The widest range, as it happened, was observed in the case of the insulin which is usually issued without preservative. At a definitely higher reaction, higher with some samples than others, the solutions again became not merely incapable of supporting growth, but apparently coccicidal. For this action of the more alkaline insulins no explanation is offered at present, but it is hardly of practical interest for the present purpose. The important conclusion from these experiments is that an insulin solution may be made into a culture medium by a slight addition of alkali, if no preservative is present.

CONCLUSIONS.

(1) Insulin solutions, with the acidity commonly given to them (pH 3–4), have a germicidal action even when no added preservative is present. (2) A slight change in the reaction towards the alkaline side not only destroys this germicidal action, but converts the solution into a culture medium if no preservative is present. The usual proportion of phenolic preservative is still effectively germicidal under such conditions. (3) Opalescence or turbidity of the solution is not an adequate indication of such change of reaction. Solutions can be made sufficiently alkaline as to remain clear and still support the growth of cocci.

I record my indebtedness to my colleague, Capt. S. R. Douglas, F.R.S., for his help and advice during these experiments.

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OBSERVATIONS ON THE PRODUCTION OF ANTIPOLIOMYELITIS SERUM IN HORSES

AND THE DISTRIBUTION OF THE ANTIBODY AMONG THE SERUM FRACTIONS.

BY R. W. FAIRBROTHER, M.D. MANCH.,

AND

W. T. J. MORGAN, M.SC., PH.D. LOND., F.I.C.

(From the Milbank Research Fund, the Bacteriological Department, Lister Institute, London; and the Serum Department of the Lister Institute, Elstree.)

WE have elsewhere recorded [1] the development of antiviral properties in the serum of one or two horses hyperimmunised by the intramuscular route with living potent poliomyelitis virus of monkey origin. The neutralisation tests with the serum revealed an activity comparable with that of human or monkey convalescent serum. The complete failure with the second horse raised again the question whether natural insusceptibility to infection with a particular virus necessarily precluded the production of antiviral bodies in response to hyperimmunisation, and it appeared desirable to attempt the immunisation of other horses.

Two additional horses were therefore given a course of intramuscular inoculations similar to that described in our earlier communications. In the hope of obtaining a potent antiviral serum in a shorter time an unfiltered emulsion of the virus-containing nervous tissue was used for the preliminary inoculations. The occurrence of severe anaphylactic-like reactions in the horses, however, forced us to continue the immunisation with the original filtered virus preparation. After both horses had received a total of 250 c.cm. of the filtered 10 per cent. virus emulsion a sample bleeding was taken, and tests were made with the serum samples to determine whether the serum had acquired any specific antiviral properties. The neutralisation tests were performed in the following manner: a mixture of the potent virus and the serum was allowed to stand in vitro at 37° for 1½ to 2 hours and left overnight at 4° C., after which time 0·5 c.cm. was injected intracerebrally under ether anæsthesia into *Macacus rhesus* monkeys.

RESULTS OF EXPERIMENTS.

The results indicated a marked difference in the protective power of the serum samples from the two horses; in one case, horse H3, this was very poor, whereas in the other horse, H4, the serum possessed marked antiviral properties.

TABLE I.—*Horse H4. Final Bleeding* (7.xi.30).

Mixture inoculated. 0·2 c.cm. 5 per cent. virus emulsion, together with—					Animal No.	Result.
0·05	c.cm. saline,	0·25	c.cm. serum		M458	0
0·20	" "	0·10	" "		M459	0
0·25	" "	0·05	" "		M460	0
0·25	" "	0·05	" "		M476	0
0·275	" "	0·025	" "		M477	0
0·275	" "	0·025	" "		M491	0
0·285	" "	0·015	" "		M492	0
0·285	" "	0·015	" "		M498	0
0·295	" "	0·005	" "		M493	0
0·295	" "	0·005	" "		M499	0*
0·2975	" "	0·0025	" "		M500	† (8 days)
Virus control	Mixture inoculated. 0·2 c.cm. 5 per cent. virus emulsion, together with 0·3 c.cm. saline.				M421	† (5 days)
					M474	† (4 ")
					M494	† (6 ")
					M497	† (4 ")

0 = animal remained quite well.
* Died T.B. nineteenth day.
† = paralysis and death, with the length of the incubation period in parentheses.

The serum of each of the horses collected before the inoculations commenced had not the slightest neutralising effect on the activity of the virus. After a rest period of six weeks further inoculations, amounting to 1100 c.cm. of the filtered 10 per cent. virus emulsion, were given to the horse H4. A large bleeding was then taken, and the separated serum tested for antiviral activity. The results of the neutralisation tests are shown in Table I. It is seen that the serum was extremely active, for 0·005 c.cm. completely neutralised the test dose of virus, which was estimated to contain at least 100 minimal infective doses.

In a previous communication [2] on the concentration of the protective substance in antipoliomyelitis serum it was shown that the protein which was precipitated at a relatively low concentration of ammonium sulphate was uniformly much more potent in antiviral action per unit weight of protein than that precipitated with higher concentrations of this salt. These experiments on the potency of the various protein fractions have been repeated by fractionating the potent immune serum from horse H4. The methods of preparing and testing the antiviral activity of the various fractions have already been described, and need not be repeated. The results are shown in Table II. Each animal received 0·2 c.cm. of a 5 per cent. virus emulsion, together with the amount of the protein fraction shown in the third column; in all cases the amount inoculated was 0·5 c.cm.

It will be seen that the protein which was thrown

out of solution on dialysis possessed potent antiviral properties, since 0·017 mg. completely neutralised the test dose of virus. Both the pseudoglobulin and albumin fractions possessed some power to neutralise the virus; 0·23 and 0·49 mg., respectively, of these latter fractions completely neutralise the test dose.

TABLE II.—*Serum Fractions.*

Method of preparation.	Mg. protein. Per c.cm.	Mg. protein. Per dose.	Monkey.	Result.
Dialysis (euglobulin fraction) ..	3·5	0·087	M520	0
	3·5	0·043	M521	0
	3·5	0·017	M531	0
	3·5	0·0086	M537	† (6 days)
	3·5	0·0034	M538	† (9 „)
Salting-out with ammonium sulphate 36 to 50 per cent. (pseudoglobulin fraction) ..	46·5	1·16	M522	0
	46·5	0·58	M523	0
	46·5	0·23	M532	0
	46·5	0·115	M539	† (12 days)
	46·5	0·046	M540	† (7 „)
Ditto, 50 per cent.—saturation (albumin fraction) ..	35·5	0·89	M524	0
	35·5	0·49	M525	0
	35·5	0·18	M533	† (12 days)
Virus controls	Mixture inoculated. 0·2 c.cm. 5 per cent. virus emulsion, together with 0·3 c.cm. saline.		M515	† (5 days)
			M516	† (6 „)
			M541	† (4 „)

These results support the conclusions reached in our previous communication, that an antiviral preparation of high concentration can be obtained by collecting the so-called "euglobulin" fraction and dissolving it in saline. The results recorded in our previous paper indicated a general distribution of the antibody throughout the proteins of the particular serum examined, and the data yielded by the examination of the serum fractions of horse H4 show a similar general distribution of antibody (Table II.).

The statement made by Weyer, Park, and Banzhaf,[3] that there was a loss of antibody amounting to about 50 per cent. in their process of concentrating anti-poliomyelitis serum, may be explained by the circumstance that the protective substance does not appear to be concentrated entirely in any one of the serum proteins.

COMMENT.

An antiviral serum of marked activity against the poliomyelitis virus has been produced by the intramuscular inoculation of the living virus in two horses. Two other animals completely failed to respond.

Weyer, Park, and Banzhaf,[3] and Schultz and Gebhardt,[4] in America, have also recently reported the successful immunisation of horses by the active virus, and it would therefore appear that the horse is a suitable animal for the production of an anti-poliomyelitis serum for therapeutic use, though at present we have no means of ascertaining without trial whether any one horse is likely to respond.

This serum has been used in a few cases of poliomyelitis in this country, but it has not proved possible, so far, to draw any conclusion with regard to its efficacy. It is well known that the variable nature of the disease makes it difficult to assess the value of specific forms of treatment in the prevention of paralysis, and it is generally believed that specific treatment with convalescent serum is likely to be of small value when given after paralysis has appeared. It may be expected, however, that the renewed interest aroused by the production of antiviral serum in large animals may lead to much-needed information on these debated points.

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CLINICAL AND LABORATORY NOTES

THE CREASES ON THE MINIMAL DIGIT IN MONGOLISM.

BY L. S. PENROSE, M.D. CAMB.,
RESEARCH MEDICAL OFFICER, ROYAL EASTERN COUNTIES INSTITUTION FOR MENTAL DEFECTIVES.

SOME of the dispute concerning the ætiology of mongolism arises from doubt concerning the precise physical signs which are, or are not, characteristic of the condition. Clear-cut signs which are easily recognised are therefore of importance, and the morphological peculiarities of the hand are physical signs which have these qualities. The transverse simian crease on the palm of the hand is, however, frequently seen in normal persons. The incurving minimal digit is a sign with many degrees of intensity and is present in a variety of different conditions, while a short minimal digit is characteristic of all so-called degenerate types of hand.

A simple and very definite abnormality found almost exclusively among aments of the mongolian type, which seems not to have been hitherto described, is the replacing of the usual three creases on the minimal digit of the hand by two creases only, so that the markings on this finger resemble those on the thumb, although the correct number of phalanges is present. The little finger has normally a distal single crease nearly opposite the distal interphalangeal joint, a medial double crease just below the proximal interphalangeal joint, and a basal digital line which is complex.[1] In the anomaly described here a new crease, usually double in character, takes the place of the distal and medial creases, and it lies between the distal and proximal interphalangeal joints.

The accompanying photograph is of the left hand of a female mongolian defective, aged 40. The unusual line on the minimal digit is clearly marked. An elderly patient was chosen purposely, in order to show that age does not obscure the clearness of this sign. The minimal digit of the patient's right hand has the usual creases, although it does not differ from its fellow in length or in the configuration of the

[1] Jones, F. Wood: The Principles of Anatomy as seen in the Hand, London, 1920, pp. 67–68.

complex basal line. The transverse simian crease is not present on either hand in this case.

It is interesting to compare the incidence of this latter peculiarity with that of the anomalous creasing of the minimal digit. In a series of 60 mongolian defectives, 44 of whom are under the care of the Royal Eastern Counties Institution, the absence of one of the creases of the little finger was observed in 16 cases. In 8 of these the abnormality was present on one hand only. The transverse palmar line occurred in 27 cases, and was present on one hand only in 10 of these. The latter anomaly seems therefore to be about twice as frequent as the former.

These two peculiarities are often met with in association. They are to be seen together in the photograph by Dr. T. Brushfield, reproduced in Tredgold's text-book.[2] In the series of patients referred to above, both anomalies were present on both hands in three cases, and in five others they were simultaneously present unilaterally. The number of associations of these two uncommon peculiarities here is greater than that which would be expected if their occurrence together were merely a chance affair. This fact suggests that the causes of the two peculiarities are related to one another.

I am indebted to Dr. F. D. Turner for permission to publish these notes, and to the Medical Research Council and the Darwin Trust for financial assistance.

WAX BATH TREATMENT.

By H. W. Hales, M.D. Camb.

The full-length wax bath was first employed in France about 20 years ago, but it is only during recent years that it has attained the recognition which it deserves. The employment of paraffin for burns and as a method of administering heat locally to joints has, of course, been widely known for a much longer period.

The technique of full-length baths consists in applying a large quantity of wax in a liquid state to the whole of the body at a temperature of 120–130° F., depending on the skin sensitiveness of the patient. The wax rapidly solidifies when it touches the skin, and at the same time contracts. Heat-loss is reduced to a minimum by applying further layers of wax on the top of the first. The whole wax coat is then still further insulated by folding over and approximating the edges of the paper on which the patient lies, and one or two layers of waterproof sheeting are also folded over the patient. In cold weather a blanket can be added. The first treatment usually only comprises the legs and thighs; the second goes as high up as the umbilicus; and the third or fourth embraces the whole body up to the neck except one arm. The total skin surfaces finally covered depends on the reaction observed during the first two or three treatments. Profuse sweating occurs in from 2 to 10 minutes both on the free skin surfaces and under the wax. After a period varying from 15 to 30 minutes the wax is removed and the patient massaged with eau-de-Cologne as a grease solvent. He then rests for 15 to 30 minutes in a cool room, and can either have a cold or tepid spray or bath, or else dress. The oral and rectal temperatures and pulse are taken before treatment, and the oral temperature and pulse at frequent intervals during the treatment. At first the pulse rises to 90–96, a little out of proportion to the temperature (if a normal ratio of 90 pulse to 99 temperature and 100 pulse to 100 temperature, and so on, is assumed), but as soon as free perspiration has been established the temperature rises and the pulse falls and they attain their normal ratio. The blood pressure falls slightly. The temperature rises from 1 to 4 degrees, depending on the personal idiosyncrasy of the patient and the amount and temperature of the wax used.

The hydrogen-ion concentration of the sweat varies with its dilution, and the parts of the body. The baths are given daily or alternate days until the sweat pH is alkaline on its first appearing, and the interval between the baths is only increased when the blood pressure is low, or when the activities or peculiarities of the patient prevent daily treatment.

It has been claimed that one of the most marked features of this treatment is the absence of skin erythema indicating that the wax has a constricting effect which prevents cutaneous vasodilatation, but I have not observed this.

Contrary to expectation, after the first few minutes there is no sense of constriction from the solidified wax, probably because its elasticity allows for stretching as the pores exude sweat. For this reason it does not seem possible to subscribe to the theory that there is less removal of blood from vital internal organs to the periphery in this than in any other form of pyretic treatment.

The physics of this treatment are open to speculation both as regards the possible effect of the initial contraction of wax, and the curious fact that owing to its super-cooling wax becomes hotter on solidifying only to cool very slowly; but here one has to consider how the temperature of the wax immediately against the body is modified by that of the skin and sweat. In this treatment one has a very perfect form of increased heat administration to the skin and elimination of heat loss to a minimum. The weight of wax is also interesting, being lighter than water and heavier than foam when compared with the somewhat similar idea embodied in Transkutan and foam-bath therapy. All these pyretic treatments can be conveniently classified according to the weight of the agent used, beginning with Pistany mud and descending through Droitwich brine, Transkutan, wax, foam, Percy Wilde pyretic couch, to radiant heat, infra-red baths, and four-pole pyretic diathermy which have no weight at all.

It is not proposed in this short communication to discuss the relationships and differences of these various treatments, but there can be no doubt that in wax we possess a valuable therapeutic agent which in certain cases works better than any other, and in a few is the only method which will give results. It must be emphasised, however, that it produces marked reactions and that indiscriminate administration by unqualified persons who are not under medical supervision may do more harm than good.

[2] Tredgold, A. F.: Mental Deficiency, Plate XX., 5th edition, London, 1929.

ENLARGEMENT OF CHELMSFORD HOSPITAL.—Extensions of this institution, costing £32,000, were opened last week without formality. They include a ward each for men, children, and casualties, and the total accommodation has been brought up to 114 beds. Other additions are a new out-patients' department, dispensary, eye clinic, minor theatre, consulting rooms, private ward block, and an administrative block; the adjoining nurses' home has also been enlarged. A sum of £12,000 remains to be raised.

BRITISH MEDICAL ASSOCIATION.

ANNUAL MEETING IN EASTBOURNE.

SECTION OF OBSTETRICS AND GYNÆCOLOGY.

THE second session of this section was devoted to the causation and treatment of

Menorrhagias not due to Uterine Disease.

Mr. A. S. PARKES, speaking on the physiological aspects of menstruation, said that in lower mammals the ovarian cycle consisted of two phases, the follicular or œstral phase, in which the Graafian follicle matured and ruptured, and the luteal phase, in which the corpus luteum developed. In the first, only minor changes occurred in the uterus, but in the luteal phase the uterus was prepared by an increase of its physiological sensitiveness, with or without proliferation of the endometrium, for reception of the fertilised ovum. If pregnancy did not take place the prepared endometrium retrogressed, the severity of the process of destruction varying in different species and the resulting hæmorrhage also varying in amount. In certain animals, however—e.g., the dog—hæmorrhage into the uterine lumen was found in the immediate pre-ovulation phase, the hæmorrhage then indeed being more pronounced than that at the end of the luteal (pseudo-pregnant) period, while it might continue then for as much as ten days. In attempting to interpret the human menstrual cycle in the light of the facts pertaining to lower animals two theories had to be considered: (1) that menstruation is a pre-ovulation phenomenon; (2) that it is an exaggerated homologue of the pseudo-pregnant breakdown found in many of the lower mammals. The weight of evidence was in favour of the second view. On this view alone, however, menstruation depended on the preliminary development of the corpus luteum, and it was now known that menstruation could occur in absence of ovulation. Since it was known that the œstral changes of the accessory organs of lower animals might take place without a morphological cycle in the ovary, this fact of course favoured the view that the breakdown was pro-œstral in nature.

Much assistance could, however, be obtained from the lower primates. In the baboon the follicular phase, during which the follicle developed, was characterised by the appearance of an enormous swelling of the vulva, which subsided after ovulation. About ten days later menstruation of the usual type appeared. The start of the cycle at puberty was marked by the appearance of the external swelling, and so there could be no doubt that in this mammal the follicular phase began and passed away some time before the onset of menstruation. It was thus possible to say that menstruation was not a straightforward pro-œstral phenomenon. On the other hand, when the monkey failed to ovulate, the same external signs of the follicular phase appeared, followed by menstruation as usual but with no premenstrual development of the endometrium; this occurred only in presence of a corpus luteum. The menstruation there and the necrosis leading to it were independent of atrophy of the corpus luteum. From the point of view of treatment of menstrual irregularities it was of the first importance to discover what the factor was that led to necrosis of the endometrium, and some fresh evidence had lately become available. Some years ago Allen showed that injection of œstrin into ovariectomised monkeys led to menstruation, and recently Hartman had shown that this effect was entirely lacking if the animal were hypophysectomised. It was thus necessary to assume that Allen's results were due to activation of the pituitary by œstrin, and that the substance causing necrosis of the endometrium was hypophyseal in origin.

CAUSATION, CLINICAL FEATURES, AND TREATMENT.

Dr. JAMES YOUNG said that the group of uterine hæmorrhages under discussion included the majority of cases of bleeding uteri, and the bulk of those cases which in the past had been described by such terms as chronic endometritis and metritis, fibrosis uteri, and subinvolution. He described the pathological and clinical features of metropathia hæmorrhagica (Schroeder's disease), the main symptom of which was metrorrhagia or irregular continued bleeding, and which characteristically occurred between 40 and 50. The endometrium showed a diffuse hyperplasia, often polypoidal, with cystic dilatation of glands and extensive areas of necrosis, while the ovaries exhibited characteristic changes—namely, cystic degeneration of follicles, and failure of formation of corpora lutea. Polymenorrhœa or too frequent menstruation was another common type of dysfunctional bleeding often accompanied by prolongation and quantitative increase in the flow. The shortened menstrual rhythm was associated with a corresponding shortening of the follicular cycle in the ovary, without any very constant changes in the endometrium.

Dysfunctional menorrhagia—excessive or prolonged flow at normal intervals—might also be due to ovarian aberration, and accompanying endometrial changes though not constant were often present. Schroeder, however, believed the chief cause to be hyperæmic states in the pelvis and inadequate contractility of the uterine muscle. Post-menopausal bleeding was not infrequently found in the absence of any gross uterine disease, and it might be that a temporary rejuvenescence of the ovary was responsible, or where the bleeding was excessive a structural degeneration in dormant follicles. In 72 cases of post-menopausal hæmorrhage Dr. Young had found 11 in which all factors other than ovarian had been excluded. Of 86 consecutive hospital cases in which the well-known causes of uterine bleeding—such as tumours and malignancy—had been excluded, 13 were cases of menorrhagia, 28 of polymenorrhœa, 39 of arrhythmic and continuous bleeding, and 6 of post-menopausal bleeding. Dr. Young pointed out the frequent association between cervicitis and menstrual irregularity and excess. In a consecutive series of 177 cases in which chronic cervicitis was the sole recognisable pelvic lesion, either menorrhagia or polymenorrhœa was present in 63 per cent. Such cases were often cured by treatment directed solely to the cervix. These findings were in keeping with the view that the cervical disease provoked the bleeding through the medium of an ovarian hormone. Another important factor was general organic disease which was present in at least 29 out of the 86 cases, while the important part played by infection was indicated by the fact that 33 of the 86 cases dated from childbirth or abortion.

As regards diagnosis, Dr. Young stressed the importance of eliminating by complete investigation such causes of bleeding as cancer and fibroids. When physical examination failed to provide an adequate explanation of the bleeding a curettage should be

carried out. Bleeding in the 'teens was the only exception to this rule, and in such cases treatment might usually be begun forthwith on a clinical diagnosis.

In treatment ovarian extracts had been disappointing in his hands, though with Sistomensin cure was reported in 5 out of 23 cases, while 5 others were much improved. Relief, immediate and permanent, might follow curettage. Of his 86 cases, in all of which curettage was done, cure followed in 11, but in 4 of these a chronically inflamed cervix was cauterised at the same time. If curettage failed the choice lay between hysterectomy, and radium or X ray sterilisation.

GENERAL DISORDERS.

Dr. H. GARDINER-HILL discussed the problems of menorrhagia in relation to general medicine. While menorrhagia might be a symptom in a number of different diseases, in some it played such a subsidiary part in the clinical picture that it was unlikely to come under the notice of the gynæcologist—e.g., the menorrhagias sometimes found in chronic cardiac failure. In other general diseases, however, menorrhagia might be one of the primary symptoms. He divided the cases into three main groups: (1) circulatory disorders; (2) the hæmorrhagic diathesis; (3) ductless gland dystrophies. Under the first heading he included active and passive congestion. Menorrhagias due to passive congestion rarely came first to the gynæcologist. Usually the general symptoms were pronounced. Active congestion, especially that due to hypertension, was an occasional cause of obscure menorrhagia. The general symptoms were often slight. The menorrhagia usually improved as a result of measures which lowered the blood pressure. He thought some of the menorrhagias of the climacteric where cardiovascular disease was present and the blood pressure high might also be accounted for on this basis. The second group, the hæmorrhagic diathesis, was somewhat ill-defined. These cases were not common, though he had seen two or three examples of a tendency to thrombocytopenia. A history was usually obtained of a tendency to bleed easily. There were often recurrent attacks from childhood of epistaxis, gastric or intestinal hæmorrhage, or prolonged bleeding after slight operations. In these cases the menorrhagia usually dated back to puberty and there was a deficiency of blood platelets. In the third group he would include disturbances in the internal secretion of the ovaries, the thyroid, and possibly the pituitary. Puberty menorrhagia was often associated with precocious development of the secondary sex characters and a peculiar type of skeleton, the lower extremities being abnormally short in proportion to the trunk, owing to early closure of the epiphyses. This was due to hyperovarianism. In primary ovarian deficiency the opposite condition occurred (eunuchoidism) and there was primary amenorrhœa. He thought that skeletal measurements and radiography should form a routine part of the examination in such cases. Thyroid deficiency was a common cause of menorrhagia, especially at puberty or the climacteric. Puberty cases were often associated with simple goitre, those at the climacteric with myxœdema. Myxœdema was particularly liable to develop after the climacteric. When, however, it developed before that time menstruation, if affected at all, usually showed a tendency to menorrhagia. In the last ten years he had seen over 100 cases of myxœdema, 17 of whom had a history of severe pelvic operations for menorrhagia when there had been no apparent pelvic cause. The patients subsequently developed typical myxœdema, and it seemed most likely to him that the original menorrhagia had been one of the first symptoms. Treatment with thyroid was often successful. He had not found hyperthyroidism at all a common cause of menorrhagia. In Graves's disease menstruation was often unaffected; in many cases amenorrhœa was present during the active stages of the disease. The rôle of the pituitary in relation to menorrhagia was as yet undecided, though recent work had shown that the anterior lobe was intimately connected with ovarian development.

CAUSES AND CURES.

Dr. S. ZUCKERMAN said that theories of the cause of menstruation were of two kinds—those which attributed it to the removal and those which regarded it as due to the addition of some influence. To the first group belongs the view that it is due to the removal of the effect either of the corpus luteum or of the follicular hormone. The corpus luteum hypothesis had been discredited, since menstruation took place in cycles in which ovulation had not occurred. The œstrin hypothesis rested on indirect evidence. To the second group belonged Hartman's theory that menstruation was due directly to the activity of a substance elaborated by the anterior lobe of the pituitary. This hypothesis was the most hopeful, for one thing since it suggested such ready experimental methods for its verification.

Mr. ST. GEORGE WILSON reviewed 92 cases treated in the last nine years. Curettage was, he thought, essential in patients of 40 years and over, but was not likely to cure. Hysterectomy was rarely necessary, but if it was done the vaginal route was preferable. Radium was ideal in doses of 200–2500 mg.-hours, and the younger the patient the smaller should be the dose. X rays were less valuable in hospital patients who wished to be cured soon, and who were apt to be discouraged if immediate results were not obtained.

Dr. W. LANGMUIR WATT said that for temporary sterilisation by X rays 27 per cent. (4 radiations of 15 minutes each) and for permanent sterilisation 35 per cent. (4 of 18 to 20 minutes each) of a skin erythema dose was required. For the former slightly larger doses were required in patients under 30 than over. With the same dosage patients under 30 would have amenorrhœa for about a year, but over 30 for about 18 months. There was usually one period after sterilisation which might be profuse. Polymenorrhagia might be associated with hypofunction of the thyroid, and a small radiation to this gland might restore normal periodicity, and this in young women might be combined with a small radiation to the spleen. If it failed, then a temporary sterilisation of only one ovary should be carried out, and cured in 50 per cent. of cases. If this failed the other ovary could be temporarily sterilised. Sterilisation by modern apparatus was simple, safe, and avoided all exposure.

Prof. J. B. DAWSON said that conditions of the corpus uteri that caused menorrhagia were commonly associated with cervical lesions. These might lead to hormonal disturbances consequent upon inflammatory thickening of the ovarian cortex following the cervical infection. In the specimen shown by Dr. Young (as an example of metropathia hæmorrhagica) the cervix was cystic and hypertrophied—a post-infective lesion.

Mr. ERIC STACEY quoted the well-known experiment in which during laparotomy a ripe follicle was punctured and menstruation followed in 30–36 hours. This showed that some process was initiated by which the necrosis of the endometrium was brought about—possibly the liberation of a hormone which produced activity of the anterior pituitary lobe. So far nobody had suggested what stimulated production of this anterior lobe hormone. Collip, of Toronto, had recently isolated a hormone from the ovary which had a similar effect to the injection of the anterior lobe hormone called emmenine. This hormone was present in the ovary in addition to the œstrin and corpus luteum hormones. It was not improbable that many of these cases of menorrhagia and epimenorrhœa were brought about by over-production of a pro-œstrus hormone. He had often noticed that a condition in the ovaries of sclerosis with over-production of follicles was present in conditions associated with pelvic congestion from whatever cause and productive of symptoms such as these under discussion.

The PRESIDENT (Mr. EARDLEY HOLLAND) said that every case of menorrhagia should have a full medical investigation, including a platelet count. He doubted if high blood pressure could by itself cause menorrhagia. X rays appeared to have this advantage over radium, that by it one could cause temporary sterilisation, while with radium this was difficult.

SECTION OF ORTHOPÆDICS.

AT the first session of this section Mr. A. S. BLUNDELL BANKART, the President, took the chair, and a discussion on the diagnosis and treatment of

Common Injuries of the Knee-joint

was opened by Mr. NAUGHTON DUNN. With increasing experience of injuries of the knee-joint, he said, he became more and more convinced that exact diagnosis of the injury was often impossible before operation. Describing the normal anatomy, he pointed out that as the joint connected the two longest bones in the body, it was subject to enormous leverage, and had therefore been provided with powerful muscles and with very strong ligaments which limited movements in all directions except flexion. Rotation at this joint was only possible in the flexed position, which doubtless accounted for the fact that in his experience strain of the flexed knee was responsible for the great majority of injuries to the intra-articular cartilages. Although anatomists described 12 bursæ in connexion with the knee, surgeons only took note of four as a source of symptoms, though possibly affections of some more deeply seated might be the cause of some lesions whose diagnosis was obscure. Articular cartilage was avascular, and this meant that it had little power of repair. The synovia not only oiled the joint, but was also richly supplied with sensory nerves, which made it a great source of pain. In connexion with swellings of the joint, it should not be forgotten that œdema of the infra-patellar pad of fat might closely simulate effusion into the joint itself.

Mr. Dunn showed a table analysing the lesions found in 522 consecutive cases of injury to the knee-joint, of which 179 were diagnosed as lesions of the internal semilunar cartilages (139 being confirmed by operation) and 71 of the external cartilages (46 confirmed by operation). Practically all subsequent speakers commented on this proportion of external cartilage injuries as most abnormally high, and Mr. Dunn in his reply was unable to account for it, but said he was sure it was not due to any clerical error, for even in the records kept personally by himself it still appeared. In the series lesions of the internal lateral ligament accounted for 34 cases and loose bodies for another 34, while each remaining group, such as crucial ligament injuries, articular fractures, Osgood-Schlatter disease, and direct infections, each only accounted for a small number. Many indefinite cases responded to manipulative treatment, which suggested that they were due to adhesions, and probably another considerable group were due to subacute, infective arthritis.

Mr. Dunn thought that one might safely make a diagnosis of damage to an intra-articular cartilage if there was a history of recurrent locking with pain and tenderness limited to the attachments of the cartilage, and provided that the joint regained normal function between the attacks. The types of cartilage injury found at operation were: tears of the anterior end; tears of the posterior part; and bucket-handle tears. Several cases were described in which the cartilage appeared normal at operation, but its removal cured the symptoms. In other cases, tenderness and pain referred to the inner side of the joint were found associated with a lesion of the external cartilage only, while simultaneous lesions of both cartilages did occur; accordingly when a typical history had led to exploration of the inner side of the joint and a normal cartilage was found, it was advisable to explore the outer side of the joint also. Mr. Dunn also referred to the difficulty presented by a slipping patella, whose history might simulate cartilage injury, while the actual dislocation was seldom witnessed by the medical attendant. Such cases were best tested in the gymnasium. Under the anæsthetic one should note whether the patella on the affected side had more lateral mobility than on the other side. Loose bodies also presented difficulties in diagnosis, but the locking in such cases was apt to be very temporary. Radiograms were shown of a case in which a piece of metal had travelled in the course of months from the inter-condylar region, where it caused intermittent symptoms, to the lower part of the popliteal space. A specimen was shown of a loose body detached from the back of the patella by a direct blow on the front; in such cases early operation was advised, as the fragment was likely to cause increasing damage to the articular cartilage. Mr. Dunn found that damage to the internal lateral ligament was caused by force applied to the extended knee, the opposite to that affecting the internal cartilage; tears were seldom complete, and many recovered entirely without operation. Where damage to both ligament and cartilage was suspected, he advised waiting till the ligament had healed before opening the joint for removal of the cartilage. For fractures of the tibial spine he recommended gradual extension of the joint and splintage before operation; for crucial ligament injuries, also, he advised conservative treatment as far as possible, seeing that he found that operative repair had not been able to restore the joint to normal. This was the reverse of the results of operation on cartilages, for in a series of 65 professional footballers a very high percentage had been able to return to this most strenuous of games, even after removal of both cartilages. Regarding the technique of operation for internal cartilages, he advised a small internal incision, nearly vertical, so as to avoid the patellar branch of the internal saphenous nerve, which in his series of cases had

seven times resulted in a painful neuroma, demanding subsequent operation.

In connexion with injuries of the extensor apparatus, he suggested that the greater was the flexion of the knee at the time of the accident, the higher would the damage occur—e.g., tears of the ligamentum patellæ occurred with an almost extended knee. He showed among others radiograms of a bipartite patella, which might easily be misdiagnosed as a fracture.

DISCUSSION.

Sir ROBERT JONES agreed with Mr. Dunn that in many internal derangements of the knee diagnosis of the exact lesion was impossible, while cases of classical cartilage symptoms might prove at operation to be something quite different. He thought it was usually possible to differentiate between injury to an internal and to an external cartilage, though locking was common to both; usually in the *first attack* the pain was correctly localised, though in the later attacks of recurrent cases it might be felt on the wrong side of the joint, so that he considered a careful history of great importance. It was rather the sudden, complete *unlocking* from flexion that was so diagnostic, and if flexion only yielded gradually, he would not consider it a case of cartilage injury at all. Clicking was more common with external than internal cartilage damage. Pain on abduction and adduction suggested injury to a ligament. In view of the fact that many injured cartilages only gave one attack of symptoms, Sir Robert advised reduction by manipulation in the first instance and reminded his hearers that reduction was never complete unless it gave full extension of the joint and immediate relief of discomfort; it was no good trying to persuade oneself or the patient that the cartilage had been reduced unless these conditions were fulfilled. He treated cases by two or three weeks of full extension during walking and after this crooked the inner side of heel of the boot, also prescribing inward rotation of the limb during running and walking. The actual technique of reduction of a cartilage was simple—i.e., the knee should be acutely flexed, rotated in and out and extended. In an unreduced case of many weeks' standing, the knee should in addition be moved in all directions to break adhesions. For this purpose the knee should first be fully flexed, then fully extended, and finally flexed with the thigh hyperextended, since this tightened all the structures on the front of the thigh; from the flexed position the knee should be extended, during which act the tibia should be rotated 10 or 15 times. Finally, the knee should be flexed while the surgeon's forearm was placed in the popliteal space and used as a lever.

In considering the treatment of ruptured crucials, one should not forget that excellent recoveries occurred with conservative treatment after complete dislocation of the knee, where every ligament must have been torn. A tibial spine displaced forward so as to prevent complete extension of the knee should be removed. Operation for torn cartilage was desirable in every recurrent case, and essential if effusion kept occurring in a patient who wanted to take part in athletics. Sir Robert agreed with Mr. Dunn that even if a cartilage appeared normal at operation it should be removed completely, for certain posterior lesions could only be discovered in the process of removing the cartilage. For loose bodies he advised either syringing, or else anchoring the body by a needle before opening the joint.

Mr. H. A. T. FAIRBANK pointed out that the extreme wasting of the quadriceps in cases of knee injury could not be due to fatigue in those cases where there was no spasm, but it must be of the nature of a reflex inhibition. He suggested as sources of obscure pain lesions of the popliteus tendon, the ilio-tibial band, and the insertion of the semi-membranosus. To bring the posterior end of a cartilage into view at operation he advised a blunt hook. He recommended that all complete ligament tears, not mere strains, should be treated by early suture. He thought that lesions of articular cartilage were less uncommon than is generally supposed, and also that fractures of the tibial spine were of two types: (1) a shearing by the internal condyle of the femur, which gave only slight displacement and did not need operation; (2) tear of an anterior strip by hyperextension, which required suture or pegging.

Dr. W. H. W. ATTLEE gave an account of the lesions found in schoolboys, the commonest being effusion, associated with rapid atrophy of the thigh muscles, while epiphysial injuries came next in frequency, and meniscus injuries third. The effusion soon cleared up if a few days' rest in bed were immediately followed by regular exercise on a bicycle or at rowing. He thought prolonged rest was far too often prescribed, while direct massage to the joint delayed recovery. The common lesion associated with pain in the tibial tubercle occurred chiefly in the football season and cleared up when football was stopped—e.g., in the running season. Painful heels then took its place. Radiographic diagnosis of lesions of the tibial tubercle was fallacious, as demonstrated by various prints, some showing peculiarities in the absence of symptoms, others the reverse. In any case it was essential to radiograph both sides for comparison. Dr. Attlee pleaded for greater confidence in the reparative power of Nature.

Mr. ROWLEY BRISTOW emphasised the importance of early exercise after operation for the removal of a cartilage. His practice was to make the patient lift the limb off the bed a few days later; he began faradism on the sixth day and got the patient up on the tenth, but continued treatment till the full range of joint and muscle power had returned.

Mr. T. P. MCMURRAY asked that the term "locking" should be abandoned as misleading, for it was the sudden unlocking that was characteristic. He disapproved of a pessimistic attitude in regard to diagnosis, and demanded more accuracy, which he said could be attained by his method of examination—i.e., flexing the knee completely, then, as it is extended, rotating it at each angle, which gives a localising pain and usually a click also.

Mr. ROBERT OLLERENSHAW showed interesting radiograms of a complete knee dislocation with excellent function after reduction. He pleaded for rest and fixation in plaster for about six weeks in the early stages of Osgood-Schlatter disease. In regard to the level of injuries to the extensor apparatus, he thought age determined it, tears of the quadriceps tendon occurring in the elderly.

Mr. R. C. ELMSLIE did not approve of resting a knee after reduction of a displaced cartilage, and quoted a case of the Oxford boat captain who rowed a trial course 24 hours after it. He advised a compression bandage, to be kept on during faradism to the quadriceps. He diagnosed patellar dislocations by noting that in the last stage of active extension the patella moved outward more on that side.

Mr. LAMING EVANS laid stress on complete removal of a cartilage, which could be done through the

usual incision by rotating the tibia outward in flexion.

Mr. McCRAE AITKEN highly approved of cycling and rowing in after-treatment, as they provided a physiological push, without grinding of the joint surfaces.

Mr. ROCYN JONES thought that the results of cartilage operations depended on the age of the patient and on the condition of the quadriceps. He held that the relative frequency of external cartilage lesions in the young, even at 4 years old, was due to congenital abnormalities; he had removed one which was disc-shaped.

SECTION OF PUBLIC HEALTH.

AT the meeting of this section, held on July 23rd, the chair was taken by Sir GEORGE BUCHANAN, the President, and a paper on public health problems attendant on

Air Travel

was read by Dr. A. MASSEY. The contingencies introduced by aerial navigation were, he said: (1) that journeys could be accomplished within the incubation periods of the major infectious diseases; (2) illicit or forced landings might result in importation of infection at places other than authorised air-ports equipped to deal with it; (3) infected mosquitoes could be brought from fever zones alive; and (4) aircraft might let fall refuse matter capable of conveying infection. Plague, cholera, yellow fever, small-pox, and typhus all had incubation periods longer than the corresponding period of air travel from infected countries. Apparently healthy passengers from these places must be kept under surveillance until the incubation periods had expired, unless they were known to be immune. It was essential that passengers should be free from manifest infection on embarkation and that aircraft should be cleaned, deratised, and de-insectised before departure. It was possible to import mosquitoes infected with yellow fever, but they would probably perish with the first cold weather. Special precautions, however, would need to be taken at air-ports of departure to ensure freedom of aircraft from mosquitoes. Rat harbourage in aeroplanes was limited, but by no means unknown. Vermin were unlikely to be carried by passengers who could afford air transport. Aircraft, unlike ships, were not limited to natural ports, and thus the importation of infection was more likely to occur. Illicit landings should be suppressed, and forced landings made notifiable to the nearest customs and sanitary air-port. Stringent international rules would be necessary to prohibit the voidance of refuse from aircraft over land. A conservancy system was essential for long-distance aeroplanes. The heating and ventilation of long-distance passenger aircraft presented peculiar difficulties. Selected aerodromes should be recognised as customs and sanitary air-ports for international travel, and to these would be attached medical and sanitary personnel.

The PRESIDENT said that presumably necessary sanitary precautions would be made available at ordinary customs aerodromes, but that special aerodromes would be set apart for more complex procedures, such as deratisation. Many unnecessary limitations in the past had been placed on shipping—for instance, the "bill of health" and "observation." It was important that these should not be imposed on aircraft. The requirements needed careful thinking out in advance. Air travel introduced new risks, especially from diseases of short incubation period.

Sir MALCOLM WATSON said that the biggest sanitary problem in the world at the moment was the probability of yellow fever getting from the West Coast of Africa to the East Coast, where it would certainly not be diagnosed, and whence it would certainly spread to Asia. He recalled the elaborate efforts necessary to eradicate the fever from Panama. Shipping would take it to Bombay and Colombo, where anti-mosquito work was in an extremely bad condition. The results—with a death-rate of 75 per cent.—would be appalling, and trade with the East would be paralysed. Civilisation would be shaken to the ground. The first step was to prevent aeroplanes from carrying the disease across Africa.

The PRESIDENT said that the international agreement against the transmission of yellow fever would be based on precautions against embarkation in the endemic areas.

Dr. MASSEY, replying to questions, said that he had no authentic evidence that rabies had been brought into the country by smuggled dogs, but it was certainly a disease that might be spread by aircraft.

Isolation Hospitals.

Dr. E. H. R. HARRIES read a paper on the Function of the Isolation Hospital in Modern Practice. He said that the isolation of the infectious sick involved also treatment, and should include teaching and research. Isolation of early cases was of great value in epidemic disease, but of very little in endemic disease, which could only be rationally controlled by active immunisation of susceptibles. Nevertheless, the isolation hospital played an important part in the care of patients under special circumstances, and its existence was justified. Its available accommodation was not, however, always used to the best possible advantage. It was unique in having no casualty or out-patient department or convalescent home. Cases were admitted direct from the general practitioner, and the inevitable result was the unnecessary isolation of large numbers of adults and children, especially in diphtheria epidemics, with resulting pressure on the accommodation. The value of the swab in diagnosis was as much over-estimated in diphtheria as the value of a timely dose of antitoxin on suspicion was under-estimated. Patients were also kept through convalescence, partly from a quite disproportionate fear of infectiousness in that period. Some infections could not be adequately treated outside an institution, but rubella, chicken-pox, and many cases of scarlet fever could be treated at home. The public needed, however, to be more impressed with the gravity of whooping-cough and measles. Treatment of fevers had become more complex, and demanded team-work and as complete a technique and equipment as the treatment of any other disease.

The fever hospitals had a monopoly of the material necessary for the clinical teaching of fevers and, with one exception, these institutions were controlled by public health authorities. The ex-resident medical officers formed but an infinitesimal part of the whole profession, yet these were the only doctors who had adequate clinical experience of fevers. By some means the material in these hospitals should be made available for undergraduate and post-graduate study. The student might clerk for a period in a fever hospital and the young pædiatrist be attached for a term to the staff. The contributions of the

fever hospitals to original research had been very small indeed; there was no stimulus, no official recognition, and usually no equipment for research. The continental and American output, on the other hand, was high. The fever hospital could make a valuable contribution to the study of early rheumatism. Suitable medical officers should be set free from routine duties and encouraged to research, and applicants for research fellowships should consider the rich field offered by the fever hospital.

The PRESIDENT said that he thought there had never been a time of greater need for stock-taking in public health.

Dr. J. D. ROLLESTON agreed that large numbers of cases were sent to fever hospitals wrongly diagnosed and entirely free from disease, and that hospitalisation of scarlet fever was largely unnecessary and only carried out for the convenience of householders and private practitioners. Certain groups of cases, however, required hospital treatment—severe cases, and cases occurring in public places of business. The isolation of measles and whooping-cough had been undertaken to save life, not with the hope of eradicating the disease. Attendance at a fever hospital ought to take place at an early stage of the student's career; he would learn there matter which would stand him in good stead in any branch of practice, and would bring him into touch with at least half a dozen branches of medicine. More research was being undertaken than Dr. Harries had suggested. A further stimulus might be applied by insisting that officers intending to remain in the service should take their M.D. and M.R.C.P.

Dr. R. A. O'BRIEN suggested an unofficial inquiry into the responsibility for diphtheria deaths due to failure to receive early antitoxin. The percentage of misdiagnosed cases was striking, and might well be related to the present method of teaching. Fevers might well be treated in annexes to general teaching hospitals. He was less optimistic about research than Dr. Rolleston. In London there was a real attempt to produce an urgent spirit of clinical and pathological inquiry, but this was not found in the provinces. A review of the literature would not show a large contribution from this country. Every general hospital had its pathologist, but there were 30,000 fever beds outside London without a single pathologist. He suggested that new fever hospitals might be built in close touch with general teaching hospitals.

Dr. W. E. PORTER pleaded the difficulties of the general practitioner called on to treat scarlet fever in the home. If one child were treated at home the whole family had to stay away from work or school.

Dr. D. S. SUTHERLAND said he had been impressed by the different amount of teaching given to medical students on this subject; in many cases it was very inadequate, even for the D.P.H. course. Classes were often much too large. Possibly some of the old poor-law institutions could take over fever work, concentrating the work of a number of small institutions where both treatment and training for nurses were inadequate. Concentration near a general teaching hospital would aid both education and research.

Dr. ARTHUR HAWLEY declared that the teaching of medical students was quite inadequate. Dr. L. P. LOCKHART suggested that the system of clinical assistantships should be extended to fever hospitals. Dr. H. KELSON cordially supported the idea of centralisation, with pathological assistance on the spot. It was the duty of the practitioner to notify cases that were at all doubtful, and accurate diagnosis was the duty of the public health service. He thought that early discharge had gone too far; marked secondary results might follow mild cases of scarlet fever, and the period of rest was of value. He urged the importance of research. Dr. J. MORGAN REES emphasised the inconvenience caused by nursing infectious cases at home. Dr. JOHN HUTSON advocated the notification of suspected cases, as distinct from developed cases.

Poliomyelitis.

Dr. G. MURRAY LEVICK read a paper on the Organisation of Treatment for Infantile Paralysis. He said that unfortunately the acute attack was often undiagnosed, the signs of paralysis following a supposed attack of influenza. Prompt treatment depended on the alertness and coöperation of general practitioners and was very important, since it affected the ultimate issue. An important diagnostic point was muscular tenderness in acute pyrexia without obvious cause. The new anterior poliomyelitis antitoxin should be administered in the first few hours, partly intrathecally and partly intravenously, but was worth giving at any time during the fever. It was of the utmost importance to posture the parts correctly at the very outset, without pressure from bandages. When the antitoxin was given, cerebro-spinal fluid could be withdrawn, if desired, to relieve pressure. Measures must be taken to preserve the contractility of all affected muscles for at least a year before hope was abandoned, and the patient must be in the hands of specially qualified people. A common mistake in electrical treatment was excessive faradic stimulation; faradic current should never be given in the early stages and deep effleurage might do great harm. The acute attack was a great shock to the nervous system, and general rest and heliotherapy should be given for months or years. The best lamp was the carbon filament, with a mercury-vapour tube for ultra-violet rays. The paretic muscles should be irradiated with intense red light. Postural treatment might demand prolonged recumbency to prevent spinal and costal deformities. Such cases should be nursed in the open air all the year round. Organised institutional treatment alone could meet economically the many needs of these patients over long periods. There was a serious lack of organised treatment for paying patients of moderate means. These children needed a different environment and different education from those catered for by the public schemes that were now spreading throughout Great Britain. Dr. Levick showed slides illustrating the work at Chailey. Affected limbs should be slung from an overhead bar and not laid flat on splints. Slinging was a most important factor in re-education and recovery of tone. It allowed free movement within the child's limits without permitting stretching of the paretic muscles. It was no more unreasonable to demand daily treatment for years for these children than to demand daily education for healthy children.

Dr. HARRIES raised the problem of whether schools should be broken up on the appearance of a case of poliomyelitis, and commented on the remarkable benefits of modern treatment.

In reply to questions, Dr. LEVICK emphasised the importance of keeping paretic limbs warm and the advantage of a light windproof material over a single layer of wool for outdoor nursing in winter.

REVIEWS AND NOTICES OF BOOKS

Recent Advances in Medicine.

Sixth edition. By G. E. BEAUMONT, M.D., and E. C DODDS, M.D. London: J. and A. Churchill. Pp. 442. 12*s*. 6*d*.

THE success of this volume has been so great that new editions have been called for almost yearly since it was first published in 1924. The present edition differs very little from its predecessors, and its scope remains unchanged. Room has been found for some account of the Aschheim-Zondek test for the detection of pregnancy in the early stages, and a few pages are given to the discussion of uræmia. The account of treatment of pernicious anæmia by stomach extracts is also new, and a few minor additions and alterations have been made in other parts of the book.

On the whole the authors have well maintained their practical attitude to the subjects discussed, and their selection of material has been wisely made. Any temptation to include much recent work which is still only of theoretical interest or has not been fully confirmed has been resisted, and apparent omissions may indicate only that certain "advances" do not yet fulfil the rigid conditions which the authors have laid down for themselves. The recent use of the higher carbohydrate diets in diabetes is not mentioned in the chapter on this disease, where the indication is that the "veg. A," or 5 per cent. carbohydrate group, must be accurately weighed out to the exact ounce. The reputed value of salyrgan in cardiac as distinct from renal œdema is also ignored. The instructions given are so clear that the laboratory methods described can be easily carried out without expert assistance. Those who wish to keep up to date in medicine, as well as students for the higher examinations, will find here a most excellent review of modern additions to medical technique.

Medical Administration of Teaching Hospitals.

By EMMET B. BAY, M.D. Chicago: University of Chicago Press. 1931. Pp. 136. 9*s*.

THE investigation reported in this volume is one of a group of studies which Dr. Michael Davis has been enabled to subsidise through a grant generously made by the Rockefeller Foundation. Dr. Bay has selected 19 hospitals and clinics, nearly all of which are associated with medical schools in the United States. The aim of the investigation is not to propose a universally acceptable plan of organisation, but to present a comparison of many organisations, in order that those interested in the problems may draw some useful conclusions for themselves.

The fundamental differences between the hospital systems of the United States and of England make actual comparison between the problems of the two countries rather difficult. In regard to teaching, for example, Dr. Bay says that in the United States "in hospitals connected with medical schools most of the patients used by the staff for teaching purposes are those who occupy free beds. Pay-patients, whether in wards or private rooms, are used only occasionally. For this reason the number of free beds in any teaching hospital is always important." In England, where practically all the beds in the teaching hospitals are at least nominally free, this problem of pay versus free beds does not arise. Again, there seems to be in the United States a conflict of policy between the lay admission office and the teaching staff, similar to that which may occur between the advertising side and the editorial side of a newspaper. The admission office is primarily interested in what the patient can pay; the professional staff are interested in the medical needs of the patients and their value for teaching purposes. In England the admission of patients is almost without exception determined by the medical staff, and the office has only to register the admission. Financial considerations do not arise, though the hospital almoner is becoming more and more active in ascertaining how much of his maintenance expenses the patient can fairly be asked to pay, and in persuading him to contribute according to his means.

Other problems investigated by Dr. Bay, such as the Open or the Closed Staff, Tenure of Appointments, Governing Bodies, the Executive Committee of the Medical Staff, Hospital Superintendents, the Functions of the Dean, and many others, give ample material for consideration by the hospital administrator in England, and the information afforded and the conclusions drawn from this information by Dr. Bay are of interest.

The general conclusion reached by most of his readers will be that in a teaching hospital all administration should be determined by two main principles: (1) the business organisation of the institution should be in the hands of the lay governors, and (2) the admission of patients, the nominations for appointments on the hospital and school staff, and the general professional conduct of the work should be in the hands of those best qualified to undertake it—viz., the teachers themselves.

Dr. Bay has written a closely analytical study, which is fresh and stimulating, and should be read by all who are interested in the complex association and interrelation of the lay governing body and of the professional staff of a teaching hospital.

Crippled Children:

Their Treatment and Orthopedic Nursing. By EARL D. MCBRIDE, B.S., M.D., F.A.C.S., Instructor in Orthopedic Surgery, University of Oklahoma School of Medicine. London: Henry Kimpton. 1931. Pp. 280. 15*s*.

THE intention of the author is to supply information which will be of interest to those who have the care of crippled children, assisting them in the recognition and treatment of the more common orthopædic conditions, particularly in the early stages when so much can be accomplished. Chapters on the technique of orthopædic nursing and post-operative duties are followed by others giving a brief, but comprehensive, description of the various forms of paralysis improvable by orthopædic measures, of spinal and joint tuberculosis, of rickety and postural deformities, and of congenital abnormalities. Each section contains a clear statement of the nurse's duties, and the volume closes with a useful glossary of orthopædic terms. Illustrated by 150 photographs and diagrams, lucidly written and well printed, this book presents in simple terms that which every nurse and social worker who is brought into contact with the cripple should know.

Allen's Commercial Organic Analysis.

Fifth edition. Vol. VIII. By Eight Contributors, under the Editorship of C. A. MITCHELL, M.A., D.Sc., F.I.C. London: J. and A. Churchill. Pp. x.+761. 30*s*.

WITH each succeeding edition of this well-known treatise the original title still used becomes less completely descriptive of the subject matter, for not only are the industrial applications of organic analysis provided, but the sources, isolation, properties, reactions, and methods of estimation of many substances, familiar in scientific circles but not yet employed commercially, are included. The present volume contains contributions by four British and four American authors, and deals with glucosides, the bitter principles of plants, enzymes, putrefaction bases, animal bases and acids, cyanogen compounds, and the proteins and their digestion products. The subject matter includes much material of interest to the physician, pharmacist, and biochemist, notably the sections on digitalis, jalap, aloes, and other drugs; the enzymes from both animal and vegetable sources; the examination of urine and the estimation of its numerous normal and pathological constituents; urinary and biliary calculi; and the digestion products of the proteins. Nothing, perhaps, illustrates the rapid progress of science more than a comparison of such a work with the corresponding sections in the previous edition of 15 years ago, an interval during which much progress has been made both in the investigation and analysis of new and little known substances. Thus whilst numerous obsolete methods have been omitted newer, more rapid, and, in many cases, more accurate methods have replaced them, and the present volume contains some 50 pages more than its predecessor. The compilation of such a mass of information is a task of no mean magnitude, even for the combined efforts of eight authors, and the high degree of accuracy shown renders the volume one of outstanding merit. Frequent references throughout the chapters and a concise bibliography at the end of each enable the reader to trace original sources and to supplement, where necessary, the information given.

The subject matter of this volume does not lend itself to much diagrammatic or pictorial representation; the few illustrations consist chiefly of enlarged drawings or photomicrographs of crystalline organic compounds. There is a good index and the book will prove of value to a large group of workers, especially when faced with a problem off the beaten track.

Les diagnostics anatomo-cliniques de Paul Lecène.

Recueillis par ses élèves. I. Généralités. By P. PAVIE. *Lésions du sein.* By P. MOULONGUET, Professeur agrégé à la Faculté de Médecine de Paris, Chirurgien des Hôpitaux. Paris: Masson et Cie. Pp. 192. Fr.45.

THIS volume is the first of a series of similar manuals projected by the late Paul Lecène, who only lived to write the general preface. The books themselves have been undertaken by his pupils, who, with exemplary piety, reproduce the whole of the original manuscript of the preface at the beginning of each volume. The present contribution consists of 52 pages of a general account by Dr. Pavie, of the value of pathological investigations in surgery, and 140 pages by Dr. Moulonguet, describing the diseases of the breast from a clinical and pathological standpoint. The work makes no great claim to originality, but describes briefly the ordinary lesions of the breast, with their pathological interpretations along the generally accepted lines. The book is thus designed rather for the student than the specialist, and is made especially valuable to him by the large number of excellent illustrations, for the most part from photographs. The only illustrations in colour, two in number, have been lavished upon the rare condition of "fat-necrosis" of the breast. In the interest of the reproductions the whole book has been printed upon thickly coated paper, making it disproportionately bulky and heavy.

Recollections of an Old and Observant Practitioner.

By JOSEPH DANIEL MCFEELY, F.R.C.S.I. London: Edward O. Beck and Co. 1931. Pp. 246.

IN this little book Dr. J. D. McFeely, who has retired from practice after long services as general practitioner, hospital surgeon, and sanitarian in Dublin and Liverpool, sets out his experiences. The author has a low opinion of most of the modern developments of professional life, pours contempt upon the panel system, and regrets the old days of apprenticeship. He mixes sound therapeutical notes with political diatribes and Irish stories insufficiently new; and he writes with a sense of grievance. But the impression is made upon the reader of great sincerity.

British Journal of Children's Diseases.

To the July-September number of this journal (vol. xxviii.) Dr. I. M. Allen contributes a paper on Neurosis in Childhood, based on 169 cases personally investigated in the out-patient department of the National Hospital, Queen-square. He divides the factors which give rise to a neurosis into two groups—viz., those which make the child less able to face his environment and difficulties, and those which appear to excite the symptoms of a neurosis in the child at various stages of development. The former include physical and mental disabilities, biochemical disturbances, a special physical habitus, the position of the child in the family, father deprivation, lack of parental training, and maternal inexperience in association with a strong sense of responsibility. The exciting causes include the birth of the next child, illness of the patient or an older member of the family, rearrangement of family relationships, failure of social adaptation, school discipline, surgical operations, accidents, puberty, and economic maladaptation. Twenty-two illustrative cases are described, and the diagnosis and treatment of neurosis in childhood is discussed.—Dr. Francis Bach contributes a paper on the Incidence of Rheumatic Fever, based on observations in Great Britain, North America, Holland, Germany, and Scandinavia. He comes to the conclusion that the disease is widespread, its incidence being related to certain sociological and geographical factors. It is common in those parts of the world where the resistance of the individual is lowered by overcrowding, poverty, and inadequate diet and where the *Streptococcus hæmolyticus* is a not uncommon inhabitant of the human nasopharynx, while it is rare in those countries where poverty and overcrowding are absent and the *S. hæmolyticus* is not an inhabitant of the human nasopharynx.—Dr. J. B. Ellison describes two cases of thrombophlebitis complicating scarlet fever in boys aged 6 and 10½ years respectively. They presented the characteristic features of the condition described by Moorhead and Abrahamson under the title of phlebitis migrans—viz., dissemination of lesions in time and space, phlebitis of the lungs and abdominal viscera, and a favourable prognosis.—The abstracts from current literature are devoted to nervous and mental diseases.

THE LANCET.

LONDON: SATURDAY, SEPTEMBER 12, 1931.

COLLAPSE OF THE LUNG AFTER OPERATION.

THE condition known as massive collapse of the lung has come into prominence since the war, though it had been described before. The main clinical features are now generally recognised. The onset is more or less sudden, with breathlessness and pain in the chest. On examination there is often cyanosis, and the pulse is weak and rapid; one side of the thorax is found to be small and immobile, dull on percussion, and with reduced, or sometimes bronchial, breath sounds, commonly concentrated in the region of the scapular angle. The heart or trachea is displaced towards the affected side, thereby distinguishing the condition from a pleural effusion, which the signs and symptoms might otherwise suggest. No agreement has yet been reached as to the production of this condition. There are two main theories: the first is that as a result of reflex action the respiratory muscles are inactivated and the lung underlying them either actively contracts or passively deflates. The second theory postulates the blocking of the main bronchus to a lobe by pressure from glands, a plug of mucus, or even muscular spasm. Neither of these theories will explain fully all the cases reported. A third theory that the condition is caused by embolism has, perhaps, less evidence in its favour than either of these. Sir CHARLTON BRISCOE brings forward yet another theory in the paper published at the front of our issue last week. He there describes in detail the alterations in aeration of the lung which occur in various postures. As the position changes from the upright to the supine, the weight of the liver and other abdominal viscera push the diaphragm upwards and somewhat backwards. The transverse and antero-posterior diameters of the thorax increase. As a consequence the lower lobes of the lungs, and particularly their posterior portions, retract on account of their natural elasticity, and therefore contain less air. The upper lobes, on the other hand, are more than usually expanded. This condition the author terms simple deflation. It is an essential accompaniment of the supine position, and in itself is harmless. It quickly disappears when the upright position is resumed and a deep breath taken. If however irritation or infection is superadded, secretion of a more or less purulent nature accumulates in the deflated area and gives rise to conditions varying in severity from a simple expectoration of mucus to a spreading, and possibly fatal, bronchopneumonia. He does not consider that what may be termed respiratory gymnastics are either advisable or effective in warding off these post-operative complications; since, however, some degree of deflation of the lung bases inevitably follows recumbency, he suggests that operations should not be performed on a patient with a cold, that no one suffering from catarrh should be allowed in the operating theatre, and that the patient should be nursed in as upright a position as practicable.

Thus far Sir CHARLTON may be confident of wide support. The theory he puts forward to explain the production of massive collapse is more likely to provoke controversy. In his opinion it is caused by the combination of simple deflation and an attack of acute pleurisy. His reasons are based in the main on the symptoms which accompany the collapse, and the fact that pleurisy has been found, either clinically or at autopsy, in a number of the cases described. The infection causing the pleurisy is assumed to come either from the lung, or from the abdomen through the diaphragm. No pathological or experimental evidence is quoted in support of this theory. No one will deny that pleurisy is a frequent accompaniment of massive collapse, for infection often precedes or follows it and may be associated with more or less pleurisy; yet it is by no means invariable. For instance, JACOBAEUS [1] and others recount cases of undoubted collapse of a lobe actually observed to occur, and to resolve, under the X rays after an intratracheal injection of lipiodol. Here there was no infection. Again in all cases of acute pleurisy the patient is either already in bed or very soon goes there; some degree of deflation will therefore be present, yet massive collapse is the exception. This in itself suggests that there must be some other factor. Sir CHARLTON regards collapse of a lobe as essentially different from the collapse of a whole lung which was often seen during the war as a result of injuries, sometimes quite trivial, to the chest or abdomen. He has no explanation for the latter. Most observers regard the two conditions as the same in essence, differing only in extent. Until a final solution of the problem is reached new theories are valuable in stimulating further inquiry, and Sir CHARLTON BRISCOE'S theory should be put to a careful test. The problem of pulmonary complications after operation is so urgent that any study of their prevention or treatment must appeal to the whole profession.

ALUMINIUM AND HEALTH.

ALTHOUGH aluminium is more widely distributed in nature than any element except oxygen and silicon, its presence in and effect on the animal system is occasionally questioned. Forty years ago an electrolytic process was discovered for isolating the metal from one of its minerals, and by using electricity generated by water power aluminium became cheap enough to be largely used as the material of vessels for the preparation of food both in industry and in the home. No obvious effect on the public health has been observed to follow this widespread use of what was an entirely new material, but there are those who hold it responsible for certain maladies

[1] Jacobaeus H. C., Selander, G., and Westermark, N.: Acta Med. Scand., 1929, lxxi., 439.

of obscure origin. Aluminium has been found in certain plants—e.g., *Orites excelsa*, an Australian tree, and in various kinds of *Symplocus*, which as long ago as 1690 were called by RUMPHIUS *arbor aluminosus*; but whilst ZBINDEN and DUTOIT found it in human blood, and WIECHOWSKI [1] estimated the quantity as over 0·004 per cent., FOX and RAMAGE failed to detect it there. Its presence in the feathers of birds, notably the jay, is to be regarded with some suspicion as feathers are apt mechanically to retain fine dusts, such as dried clay, which contain alumina. A considerable amount of work has been done on the effect of feeding various kinds of animals with food containing aluminium; in some cases the doses given were grotesquely large if the object of the experiment was to elucidate the question of the effect of aluminium cooking vessels and food containers on those consuming the food so prepared.

In a recent annotation [2] reference was made to controlled work at the Rowett Institute on the addition of aluminium to the diet of freshly weaned pigs. Since then the subject has been dealt with in another paper by this author. K. MACKENZIE has reported [3] further work done there on young rats, and D. TOURTELLOTTE and O. S. RASK similar work [4] in America. MACKENZIE introduced the aluminium in the form of a baking powder containing acid calcium phosphate and sodium aluminium sulphate, whilst RASK and his colleague used aluminium chloride, the percentages of the metal in the foods, which were alike in other respects, being respectively 0·1 and 0·06. The controls used by MACKENZIE received similar rations but containing only about 0·0001 per cent. of aluminium naturally present. He found that both groups throve well, the weights increasing from about 40 to 200 grammes in the course of 12 to 16 weeks. Analyses of the food, urine, and fæces were made for periods of 7 to 12 days. In the rats receiving only the aluminium naturally present in the diet the urine contained from 1 to 2 per cent. of the total input, in those receiving added aluminium only about 0·01 per cent. of the input was found in the urine, demonstrating that either the metal reached the circulation in mere traces, or was held up in the tissues. The large proportion—from 84 to 95 per cent.—recovered in the fæces showed that absorption was at any rate small. The difficulty of collecting the excreta completely may well account for the remainder, since analyses of liver, lungs, heart, stomach, and small intestine in groups of 8 to 10 rats showed aluminium contents of the same order in both those receiving this element and the controls. TOURTELLOTTE and RASK's previous work led them to conclude that aluminium compounds are not toxic or detrimental to any biological function when present in diets in concentrations up to 600 parts per million (of the same order as they and MACKENZIE had given to rats), that they were not appreciably absorbed out of the intestinal tract, and that animal tissues contained less than 2·0 parts per million of aluminium. Their conclusions having been challenged by other workers these authors have confirmed their work by showing that in some cases the challenge was based on erroneous interpretation of spectrograms. In the experiment referred to, which was directed solely to investigating directly the absorption of aluminium, the combined liver, spleen, kidneys, and testes or ovaries of individual rats, and the combined thyroids of six rats showed only 1 part or less per million of aluminium, amounts similar to those previously found by them and others in animals fed on aluminium-free diets. The rats appeared to be healthy and normally fertile.

In face of these facts and of a statement by the German Board of Health that no injury to health or indication of absorption could be found in dogs fed with aluminium hydroxide for over 12 months, it is difficult to attribute groups of symptoms, such as are described by Dr. LEHUNTE COOPER in a recent pamphlet,[5] to the use of aluminium cooking vessels, especially as the authors whose feeding experiments are quoted in support of his deductions from clinical observations are those whose work TOURTELLOTTE and RASK have shown to be in error.

[1] Münch. med. Woch., 1921, lxviii., 1082.
[2] THE LANCET, 1931, i., 35.
[3] Biochem. Jour., 1931, xxv., 287.
[4] Amer. Jour. Hyg., July, 1931, p. 225.

LATENT JUVENILE TUBERCLE.

CLINICIANS have often contrasted the relatively acute forms of pulmonary tuberculosis met with in adolescents and young adults with the chronic fibroid phthisis of middle life. Such a rough classification may serve a useful purpose if it emphasises the fact that the young are specially susceptible to the acuter manifestations and the more rapidly progressive forms of the disease. In these cases the patient's life may depend upon early diagnosis and immediate treatment. The adolescent suffering from early infiltration limited to a few lobules of one lung, and whose admission to sanatorium is delayed for a few weeks, will probably spend the waiting period wandering about the streets in a pathetic attempt to obtain the advantages of "fresh air," and may arrive at the institution with both lungs severely affected; but the life of a middle-aged working man whose lungs have been the seat of a smouldering infection for years will not be endangered on account of the length of a waiting list. It would, however, be a mistake to imagine that there are any age limits to the various types of pulmonary tuberculosis, for even among the young latent and sluggish forms of the disease are common. A girl in adolescence may acquire chronic fibroid phthisis of a type so indolent that no inkling of the true cause of a chronic malaise may arise until some increase in a cough, previously slight and intermittent, draws the practitioner's attention to the chest, a few sticky adventitious sounds or some slight irregularity in the breath sounds rouse his suspicions, and a skiagram shows extensive fibrosis of the lungs.

In the latent or sluggish type of tuberculosis in

[5] The Danger of Food Contamination by Aluminium. London: John Bale, Sons and Danielsson.

young people the problems of diagnosis, prognosis, and treatment are not easy to solve. Three French observers have discussed these problems anew.[1] Symptoms may be so slight that even the patient's mother may overlook them, there may be no loss in weight at a time when the disease is already firmly established in both lungs; even a progressive gain in weight is not unknown. The cough which is so marked a feature of the common forms of phthisis may be entirely absent for prolonged periods. A little "phlegm from the throat" in the morning does not suggest that anything is wrong with the chest. Should persistent lassitude drive the patient to her doctor's surgery a careful examination may reveal no physical signs of disease. The temperature is found to be normal, and a morning and evening record kept for a period of a week or more by the district nurse shows no evidence of fever. Finally, a sample of sputum, obtained with difficulty, is sent to the public health laboratory, and, to use the patient's formula, "no trace whatever of the disease is found." Yet if a skiagram is obtainable at this stage it may show unequivocal evidence of pulmonary fibrosis, calcifications, and even fibrous-walled cavities in one or both lungs. The difficulties of prognosis may be almost as great as those of diagnosis, for neither symptoms nor physical signs, nor even a single radiogram, may supply definite evidence whether the disease is still active and progressive. X ray examination may prove that calcification or dense fibrosis has taken the place of caseous matter in many areas, but as a rule shadows less intense than those cast by the above will leave interpretation in doubt. Obviously, if the disease has already been soundly healed by natural processes no treatment beyond the observation of the rules of hygiene is indicated, but if there is any evidence that complete arrest has not been secured the question of sanatorium treatment will call for consideration, and it may not be easy to decide if this should be recommended.

The Insurance Act provided for the sanatorium treatment of industrial workers. We have thus been able to observe the results of treating chronic fibroid phthisis in the form of the disease typically seen in middle-aged working men on a large scale. The results have been profoundly disappointing, though the sanatorium-colony where the patient is able to undertake carefully selected work despite his disease has met with a measure of success. Ordinary sanatorium treatment may cause temporary amelioration of symptoms in patients of this type, but it does not restore damaged lungs or working capacity. The young patient suffering from the form of disease we are considering resembles the middle-aged patient. The disease is not amenable to collapse therapy, the only form of active treatment which can be described as curative, and prolonged periods of sanatorium treatment are costly to the community and wearisome to the patient. A disease which has persisted for months or years, which has already resulted in permanent damage to the lungs, is unlikely to yield to a simple change in the manner of life of its victim. If, however, the opposing forces of the patient's resistance and the disease are almost balanced, a period in a sanatorium may suffice just to tip the scale and check the further spread of disease. Further, an appreciation of the true position can best be obtained by a period of observation in a sanatorium. During this period an investigation can be made which will include a search for constitutional evidence of active disease, particularly with regard to the patient's temperature at rest and after activity; serial skiagrams, to determine whether there is any change in the character and extent of the shadows; and a more complete search for tubercle bacilli in sputum and fæces. Microscopical examination of the sputum may not be sufficient to determine if tubercle bacilli are still at work. In the more active forms of tuberculosis the bacilli swarm in the diseased areas, and can be found in almost every sample of sputum examined. In the latent and sluggish forms the bacilli are often absent or difficult to find. Inoculation experiments with guinea-pigs may be necessary to determine their presence. If at the conclusion of these investigations no evidence of active disease is found, the patient may be discharged with the assurance that a normal if sheltered life may be resumed. If any evidence of active disease is forthcoming residence in the sanatorium may be prolonged for a further period, or the patient may be discharged to continue treatment on sanatorium lines under the care of her own practitioner at home.

[1] Dufort, A., Angerany, J., Despergnes, H.: Formes radiologiques de la tuberculose pulmonaire. Arch Med. Chir. de l'Appareil Resp., 1931, vi., 65.

READING IN HOSPITALS.

THE Dean of St. Paul's gave fresh impetus to the movement for hospital libraries in a whimsical address at the annual conference of the Library Association held at Cheltenham last week. He assessed the reading public at some 17,000,000 persons, each of whom on an average devoured 12 novels a year and would appreciate a supply of books when invalided. Lieut.-Colonel J. M. Mitchell, secretary of the Carnegie United Kingdom Trust, who occupied the chair, expressed a doubt whether public libraries as a whole had taken the part they might in providing books for patients in hospitals. There was no reason, he said, why men and women who were confined to hospitals should be deprived privileges which sick persons were granted in their own homes, and he promised the support of the Library Association in helping hospital authorities to develop an experimental service of books. Sir Bruce Bruce-Porter, who followed Dean Inge, remarked how vital to the sick is the companionship of books. There was, he thought, urgent need for recasting the side of hospital life dealing with the mental life of its inmates. He would set aside in each hospital a large room for a library which could also be used as a dining and reading room. The supply of books must, he thought, be organised on a national plan. Voluntary effort was good, but the post of librarian in a big hospital was onerous enough for a whole-time job. The helpers must be able to sense the type of book which would interest their patients and the librarian must have knowledge of the books he recommends in the same way as the physician should be fully acquainted

with the composition of a medicine he prescribes. For a tuberculous patient, for instance, a book on the Brontë family, in which six children are portrayed as dying of consumption, would not be as suitable as the lives of Voltaire, Emerson, and Ruskin, who all lived to advanced age in spite of this disease. Later, at the summer school of librarianship in Birmingham, Colonel Mitchell expressed his pleasure that the hospital library problem was being taken up seriously by the Library Association, for he believed that quiet leisurely reading was among the most important of therapeutic agencies. Mr. C. E. A. Bedwell, house governor of King's College Hospital, frankly stated the conflict between the aims and ideals of hospital and library, but did not despair of its solution. It seems that some 2000 hospitals and institutions are already provided with books through the hospital library organised by the British Red Cross Society and Order of St. John, and Sir Arthur Stanley is now asking hospitals with 100 beds (or fewer) to contribute on the basis of a guinea a year for the use of the library, and larger hospitals to contribute two guineas. Many voluntary hospitals have agreed to subscribe on this basis, and appropriate grants have been voted by committees of the London County Council. So far, the whole of the hospital work has been done by voluntary librarians, but whether this will continue to be possible is doubtful.

ANNOTATIONS

INCIDENCE OF DISEASE AMONG DAIRY COWS.

IT has been realised for some time that the average milking life of a dairy cow is short, and estimates varying between 2 and 5 years have been given. In view of the fact that a cow does not attain her greatest productivity until about five years after her first calving (and subsequently only declines slowly for several years) it is clear that milk carries a heavy economic burden in the wastage occurring among the cows which produce it. During the last few years attention has been directed to the seriousness of this problem of cow wastage and, as a first step in its attack, several schemes have been started which aim to measure, and to determine the relative importance of the factors responsible for, the losses from our dairy herds. In Scotland a committee was appointed to collect data, and they commenced operations in January, 1930; their scheme covered 490 milk-recorded herds, and an interim report issued by the Hannah Dairy Research Institute, Ayrshire, briefly summarises the causes of the disposal or death of some 3600 cows. In England wide inquiries have been undertaken at Cambridge and Reading, the former starting in October, 1928, and the latter in October, 1929; these two centres have been working in close touch and on identical lines. Others have also collected data on the question—notably Mr. W. Lawson in East Sussex and Mr. G. H. Garrad in Kent—and the results so far obtained by all English workers have been very consistent. In the following paragraphs the Scottish and the Cambridge (as typical of the English) figures are discussed; the methods of classification in these two cases have differed somewhat, but with a few minor adjustments the results can be presented in comparable form. The percentages of the total disposals accounted for by the various causes were as follows:—

—	Scotland.	Cambridge.	
		1928–29.	1929–30.
Normal causes—			
Sold as surplus stock ..	19·4	17·4	20·9
Poor milk yield	16·6	19·6	19·2
Accident	1·5	1·2	1·4
Old age	4·9—42·4	5·3—43·5	4·0—45·5
Disease—			
Failure to breed.. ..	17·2	23·7	26·8
Abortion	2·1	3·6	3·8
Udder diseases	15·0	7·0	4·7
Advanced tuberculosis and Johne's disease ..	5·4	10·4	9·6
Failure in tuberculin test	2·8	2·4	1·8
Miscellaneous	15·1—57·6	9·4—56·5	7·8—54·5
	100·0	100·0	100·0

The first four causes have been grouped together as above in the Scottish report, the idea being to separate them off from the definite wastage due to disease; in passing it is of interest to note the very small proportion of cows that live long enough to enter the "old age" group at their disposal. Under the next heading it is seen that sterility is easily the largest single factor causing wastage. Abortion appears relatively unimportant, but it must be remembered that some cows returned as sterile may really have aborted in very early pregnancy, or be suffering from the after-effects of abortion. These reproductive diseases together account for roughly 20 per cent. of the total disposals in Scotland, and as much as 30 per cent. in England. Udder diseases, on the other hand, are more common in Scotland than in England. Tuberculosis and Johne's disease have been put together in the table because it is probable that the two are often confused; this group is responsible for 10 per cent. of the total disposals in England, but only 5 per cent. in Scotland. Failure to pass the tuberculin test appears as a low cause of wastage, but it must be remembered that only about 15 per cent. of the cows are exposed to this risk—i.e., belong to tested herds. In the Cambridge data it was found that approximately 3 per cent. of the cows actually tested failed during the year—i.e., 1·5 per cent. at each of the six-monthly tests. From the statistical point of view, "miscellaneous" is an unsatisfactory grouping: it comprises, chiefly, cows that die at or just after calving, cows that die from unknown causes, and cows returned as suffering from "bad feet."

The Cambridge data cover approximately 13,500 cows belonging to 540 herds situated in the counties of Bedford, Cambridge, Hertford, Lincoln, and Norfolk. In the two years the total number of disposals was 2849 and 3165 respectively; these give an average disposal of 22·30 per cent. of the cows in the herds per year, from which it can readily be calculated that the average length of life, in one herd, of a dairy cow is very close to four and a half years. The average total milking life must be rather longer, as a proportion are sold in milk or in calf, and so presumably survive for some time in other herds. As near as it is possible to estimate, it seems that the average total milking life lies somewhere between six and seven years. Though the data discussed above have all been derived from milk-recorded herds, other information that is available indicates that the non-recorded herds would yield very similar results, were it possible to obtain data from them.

One point arises from the table on which it may be well to insist—namely, that from the farmer's point of view tuberculosis is relatively unimportant as a cause of wastage. This makes his strenuous and expensive efforts at its eradication the more

praiseworthy, and shows that he realises the necessity of making his milk safe for human beings. It will probably be agreed that he should be given sympathetic help in order that the progress of recent years may be maintained.

THE PATHOLOGY OF MEASLES ENCEPHALITIS.

CONTROVERSY still centres on the nature of the encephalomyelitis which occasionally follows measles, and two recent papers throw some fresh light on it. F. Wohlwill in 1928 gave a clear description of the pathology in two cases in which he found as the chief lesion perivascular zones of demyelination in the brain and spinal cord. This description was soon after confirmed by investigations on the Continent and in America, as well as in this country. At present there is little question that the lesion is histologically very similar to that of post-vaccinal encephalomyelitis, and is not, at least in the great majority of cases, a hæmorrhagic encephalitis, as was at one time supposed. Undoubtedly the latter condition may also occur after measles, but since the characteristic perivascular demyelination of this form of encephalitis has been recognised the hæmorrhagic nature of the condition has fallen somewhat into the background. The report of a case from Paris by P. Lechelle, I. Bertrand, and E. Fauvert [1] reopens this question. Their case was complicated by thrombosis of the superior longitudinal sinus, and though they found the perivascular zones of demyelination described by other authors, these contained so much effused blood that they were inclined to attribute the destruction of the nervous tissues to hæmorrhage rather than to a neurolytic process. They did not think, however, that the hæmorrhage resulted directly from the sinus thrombosis, but rather that both were due to an encephalitic process. On the other hand, A. Ferraro and I. H. Scheffer [2] have lately published reports of the pathological examination of six cases of measles encephalitis in New York, two of which occurred in May and June, 1928, and four in March, April, and May, 1930. The lesions were almost the same in all, and consisted mainly of a perivascular demyelination with some destruction of axis-cylinders and proliferation of microglia. They consider that the lesion which they observed is "comparable to and even identical with" those which have been described in post-vaccinal encephalitis, and in the "paralytic accidents" of rabies vaccination. Whether it is a true inflammatory process or a special form of encephalopathy they leave an open question, since inflammatory cells are scanty in or even absent from the lesions. They incline to the view that this form of acute disseminated encephalomyelitis is a toxic reaction of the central nervous system developing in a number of different virus infections, but they make no attempt to explain the undoubted fact that this form of encephalomyelitis has become much more common of recent years.

BIOLOGICAL DATA.

WITH the completion of the six volumes of Tabulæ Biologicæ in 1930, the original purpose of this work was accomplished, but in order to keep such a comprehensive reference book up to date, it has been found necessary to issue supplementary volumes in the form of a quarterly journal, under the title of Tabulæ Biologicæ Periodicæ. We have before us [3] three of the four parts which go to produce the first volume of the supplement which is to form volume 7 of the original publication; it is to contain approximately 420 pages when complete. Subscribers to the original work are to receive the present volume at the reduced sum of R.M. 48. and to them the acquisition of this volume will be essential, while the possession of the earlier volumes will be indispensable to those who think of purchasing this volume. Many of the subjects comprised in this supplement are of the nature of additions to or amplifications of data contained in the original work, but, with the rapidly extending knowledge of the subject of biology, new sections have been added. To attempt to give a summary of the contents would be like describing the subject matter of a dictionary; suffice it to say that the needs of every branch of biology are well provided for. Thus while medical readers will find ample data on the vitamin, iodine, or mercury content of food materials, on experimental phonetics, or on the physiological effects of work or athletics, the pure physiologist will value the tables of physico-chemical constants of blood and tissue fluids, or the alcohol content of various organs of fowls exposed to an atmosphere saturated with alcohol—to take a few examples at random. For the plant cytologist there is an exhaustive list of chromosome numbers extending over 35 pages. References to the original sources of the data supplied are given throughout, and the work will be invaluable as a means of tracing those pertaining to every branch of biological science.

THE TIME OF CONCEPTION.

CONCEPTION is usually reckoned to take place on the actual day of cohabitation. There are, however, several factors which may cause appreciable delay between coitus and impregnation. Prof. R. Kräuter [1] points out that in order to give satisfactory answers to the questions, often put, of whether impregnation can occur at any time, whether there is a sterile period and whether there is an optimum period, it is necessary to know certain factors. These are the time taken for the spermatozoon to enter the cervix and find the ovum; the viability of sperm; the time of ovulation and the viability of the ovum. According to most authorities, the semen usually enters the cervix at or shortly after ejaculation and is distributed by the rhythmical contractions of the uterus, but delay may be caused if it is voided into the anterior vault or near the orifice of the vagina. The time the spermatozoa take to reach the ovum in the ampulla is not definitely established, but Lott calculated from their rate of chemiotactic movement—about 3·6 mm. per minute—that it would be between three-quarters of an hour and an hour. This may be extended by any cause of obstruction, but Birch and Hirschfeld have, according to Prof. Kräuter, demonstrated seed in the tubes 14 to 16 hours after coitus. Views on the viability of semen in the female genitalia are very varied, some authors holding that it lives only for two days, and one—Nürnberger—that it keeps its motility for a fortnight. It is, however, doubtful, as Prof Kräuter points out, whether a motile seed is necessarily still fertile. The time at which ovulation takes place is equally dubious, but from a symposium of observations Prof. Kräuter deduces that in a normal cycle of 28 days it may occur at any time between the seventh and the nineteenth days from the beginning of the menstrual period—most probably between the fourteenth and sixteenth days. He could find no record

[1] Bull. et mém. Soc. méd. des hôp. de Paris, 1931, xlvii., 898.
[2] Arch. Neurol. and Psych., 1931, xxv., 748.
[3] Tabulæ Biologicæ Periodicæ. Vol. I. Edited, with the coöperation of a number of experts, by C. Oppenheimer and L. Pincussen. Berlin: W. Junk. 1931. R.M.55, or to subscribers R.M.48.

[1] Zeits. f. ärztl. Fortbildung, May 1st, p. 276.

of ovulation in the last four days before a period. In qualification of these data, he reminds readers that ovulation may be much modified by various stimuli, such as disorders of menstruation, drugs, operations, and even possibly by coitus. It is, he says, agreed that the ovum enters the tube immediately, but its viability is a matter of speculation and is given by some writers as a few hours and by some as several days. Döderlein thinks it remains fertile for fourteen days.

So far as these observations go, it appears that coitus at any time between two periods may lead to conception. If it takes place immediately after menstruation, an early ovum may be fertilised or the seed may remain active until ovulation. If it occurs shortly before menstruation, however, it is not likely to lead to pregnancy, unless the ovum remains fertile for longer than is generally believed. Statistics quoted by Prof. Kräuter show that almost 50 per cent. of the conceptions in the group studied occurred in the interval, 41 per cent. in the postmenstruum, and 9 per cent in the premenstruum. But he does not define these terms exactly. Accurate figures are not easily obtained, and it may be noted that Knaus [2] insists that in the ordinary 26–30 day cycle conception is only possible between the eleventh and seventeenth days.

THE TREATMENT OF HÆMORRHAGE FOLLOWING PROSTATECTOMY.

THE respective merits of various methods of stopping hæmorrhage during and following operations for removal of the prostate were discussed last year at a meeting of the Section of Urology of the Royal Society of Medicine.[3] Mr. Kenneth Walker, who opened the discussion, had tried packing to stop oozing after the Freyer operation in earlier days but found it unsatisfactory owing to necrosis and the unpleasant state of the bladder when the packing was removed. Then he had tried hæmostatic bags, but these did not always control the hæmorrhage and often did not exert uniform pressure on the prostatic cavity. Mr. Walker said that he now preferred the open operation where possible, and did not spend long in trying to secure bleeding points deep in the prostatic cavity. If bleeding did not cease after placing the suture, he used light packing. In cases not suited for the open operation he used packing, leaving the pack in situ for six or seven days, and trusting to the frequent instillation of mercurochrome after its removal to clear up the sepsis. Mr. Swift Joly also praised the Thomson-Walker open operation, which gave more perfect hæmostasis than the earlier methods. In his experience the flavine pack gave pain and hæmorrhage was apt to follow its removal. Sir John Thomson-Walker explained that he himself did not prolong the operation by seeking bleeding points but packed round a catheter. He removed the packing in 48 hours, but replaced it if bleeding recurred. Mr. G. E. Neligan and Mr. Jocelyn Swan alone advocated the use of a Pilcher's bag to control hæmorrhage. These diverse opinions from British genito-urinary surgeons are of interest in view of a discussion held at the New York Academy of Medicine on post-operative treatment of urological cases, more especially cases of prostatectomy.

The opening paper of this discussion by Dr. H. G. Bugbee of New York is printed in the July number of the *American Journal of Surgery*. American specialists are apparently almost unanimous in their approval of hæmostatic bags. A few of those who took part in the discussion at the New York Academy of Medicine appeared to prefer the use of gauze packing but all agreed that the best method of dealing with oozing from the prostatic bed was by means of pressure rather than by an open operation that aimed at ligature of bleeding points. It must be borne in mind that the majority of those who took part in the American discussion were advocates of the two-stage operation in which a free exposure of the prostatic bed is difficult or impossible. A point on which American and British genito-urinary surgeons agree is the value of blood transfusion in diminishing the danger of post-operative hæmorrhage.

[2] Quoted in Jour. Amer. Med. Assoc., August 8th, p. 408.
[3] See THE LANCET, 1930, i., 1185.

LIVER EXTRACTS FOR PARENTERAL USE.

THE satisfactory treatment of the pernicious anæmia syndrome is dependent upon adequate dosage of liver or its substitutes. In chronic cases Beebe and Lewis [1] have given as much as 3 lb. of liver a day and in certain instances even such large doses are without effect. There have therefore been repeated attempts to obtain some alternative and more effective method of administering the effective principle. Last year Cohn, McMeekin, and Minot described excellent results following the intravenous use of highly purified extracts, but the technical difficulties of preparation made such extracts impracticable for general use. Gänsslen then reported satisfactory results from treating a case of Addisonian anæmia, that had failed to respond to oral administration, with an intramuscular extract. French observers have also reported [2] a more rapid response to intramuscular injection than to liver by mouth, but unfortunately they gave no details of the method of preparation. In our own columns (1931, i., 857) Castle and Taylor showed that the original G fraction of Cohn, Minot, and their associates, which is the equivalent of certain commercial extracts for oral use, can with suitable care in preparation be satisfactorily administered by intravenous injection. The fraction contained a blood pressure reducing substance, but if given at a rate less than 4 c.cm. a minute, the effects were only slight and transitory. Strauss, Taylor, and Castle [3] have now also found that by a slight modification in preparation of the solution the same G fraction can be used as a basis for an intramuscular extract. The injection of the equivalent of 10 grammes of liver daily of such an extract gave a maximum reticulocyte response in typical cases of pernicious anæmia within five to seven days. They suggest that the extract necessary for a week's treatment when given by mouth may, if given by daily intramuscular injection, suffice for five to six months. Extracts for intravenous use were found to be 15 to 30 times as potent as the equivalent amount given by mouth. Further, certain patients responded to intravenous treatment after oral administration had failed. It is clear therefore that the active principle is more effective when given by parenteral injection than when given by mouth. The discrepancy adds support to Castle's original suggestion that failure of absorption of hæmatopoietic factors contained in the food or elaborated in the stomach is an

[1] Beebe, R. T., and Lewis, G. E.: Amer. Jour. Med. Sci., 1931, clxxxi., 796.
[2] Archand, C., and Hamburger, M.: Presse Méd., 1930, xxxviii., 1273; Aubertin, C., and Voillemin: Bull. et Mém. de la Soc. Méd. d. Hôp. d. Paris, 1930, liv., 749.
[3] Strauss, M. B., Taylor, F. H. L., Castle, W. B.: Jour. Amer. Med. Assoc., August 1st, p. 313.

important factor in the ætiology of the pernicious anæmia syndrome, especially those cases associated with chronic disturbances of the lower intestines and an apparently normal gastric function.

CONGENITAL PYLORIC STENOSIS.

THE treatment of this condition in this country is now predominantly surgical. In his analysis last week (p. 526) of 18 cases at the Middlesex Hospital from 1919–30 Mr. C. MacLeod stated that only the first five were treated medically, the remaining 13 (all the cases since 1924) by Rammstedt's operation. And in introducing the discussion at the Eastbourne meeting of the British Medical Association, Mr. Max Page pointed out (p. 533) that this operation was accepted in this country as the treatment giving the best results. Other views were laid before the section on diseases of children at the recent annual gathering of the American Medical Association at Philadelphia.[1] Dr. Orville Barbour, who opened the discussion, held that spasm plays a part in almost every case of pyloric stenosis, and that this spasm can be relieved by irradiation. He applies what he calls a roentgeno-therapeutic test to any case which does not respond to medical treatment within 48 hours. X rays are applied for three to five minutes to the upper part of the chest, when, if the obstruction at the pylorus is due mainly to spasm, the symptoms abate within 24 hours. If the obstruction caused by the tumour is extreme, little or no abatement occurs, but the patient is in a better condition to withstand operation than after a prolonged period of expectant treatment. While some other speakers at the American meeting were in favour of the irradiation treatment, which appears to produce its effects by a non-specific protein reaction stimulating the sympathetic nervous system, others supported the view that in all cases of true hypertrophic stenosis a tumour can be felt, and in most of them early operation is advisable. If after several attempts by trained observers a tumour cannot be found when other criteria are present, the case is probably one of pyloric spasm. It was admitted both at Eastbourne and Philadelphia that radio-graphy is disappointing in the help it gives towards diagnosing between spasm and true stenosis. In America it is an axiom, generally attributed to Sauer, that the skill of the physician is the outstanding feature in the prognosis of pyloric stenosis. From what was said at Eastbourne, it would appear that once the diagnosis is made the outstanding feature in the prognosis is rather the skill of the nurse. Dr. Donald Paterson produced striking evidence of the great difference in post-operative mortality between private and hospital cases, due presumably to the fact that in a nursing-home a baby has the individual attention of special nurses day and night. Reviewing the two discussions, it is evident that the old controversy between advocates of medical and of surgical treatment is no longer acute. It is now agreed that when a definite tumour exists operation is advisable, unless the child had already passed the third month before the symptoms became acute. Medical treatment must be in accord with recent biochemical work. As Dr. Noah Morris pointed out at Eastbourne, babies with pyloric stenosis pass easily into a state of alka-losis; washing out the stomach with sodium bicar-bonate solution and the administration of citrated milk are therefore unsafe. We hardly know whether irradiation is to be advised when a well-marked pyloric tumour is present, but the delay of 24 hours involved in Barbour's test is not serious, and further investigation might be made along this novel line. Opportunity to do so is likely to arise, as the malady seems to be on the increase in this country.

[1] Jour. Amer. Med. Assoc., August 15th, p. 455.

A NEW DISEASE.

UNDER the name of "Rift Valley fever" Drs. R. Daubney, J. R. Hudson, and P. C. Garnham describe [1] a fresh human disease which they have identified in Kenya. Like many other profitable things which have lately come to the student of infection, this new information arose from the investigation of veterinary subjects when the authors were asked to look into an excessive mortality among new-born lambs. This, they found, was due to some agent which would pass through a fine Chamberland filter. The condition is not contagious and there are fairly good reasons for suspecting a mosquito as the insect vector, though this point is not yet settled. The character-istic lesion of the disease in lambs is a focal necrosis of the liver, not unlike the condition found in yellow fever, with nuclear fragmentation and cytoplasmic "bodies." In adult sheep the disease is much less severe. It causes abortion and a moderate mortality in ewes and much the same in cows; other domestic animals appear to be immune. During the course of the investigation of the sheep, all the four Europeans involved developed a dengue-like fever, with rigors and severe pains about the joints, the whole attack lasting about four days. It was then found that most of the natives who had been in close contact with the original epidemic in the sheep had had similar attacks. Finally, a man was deliberately inoculated with the filtered plasma from an infected lamb which caused typical reactions in two sheep injected at the same time. He took ill in the characteristic way on the third day, and his blood proved infective to sheep for six days after his temperature rose but for no longer. We understand too that several persons have been infected while working at the disease in animals in this country, and there can be little doubt that we have an addition to make to the list of infections to which man is subject. It is perhaps of relatively little practical moment, but trivial diseases of limited geographical distribution such as this which are followed by a substantial resistance would afford excellent material for the investigation of immunological problems in man.

THE BIOLOGICAL METHOD IN PSYCHIATRY.

ALTHOUGH psychological medicine lends itself to philosophic treatment, general biological method is not always adequately used by psychiatrists who, in their zeal for either purely mental or purely physical categories of explanation, slip into a one-sided point of view, which leaves essentials of organic life, philosophically viewed, out of account. As a healthy corrective to this weakness, Prof. W. A. White opens his work on Medical Psychology[2] with a discussion of the meaning of "organism," and approaches this topic from the angle made familiar to us by Prof. Child in his conception of physiological and dynamic gradients. Having established bio-logical premisses for argument, the author illustrates from biology the value of the concepts of Ambivalence and Conflict in all vital phenomena, so that the familiar

[1] Jour. of Path. and Bact., July, 1931, p. 545.

[2] Medical Psychology. By Prof. William A. White. Nervous and Mental Diseases Monographs, No. 54. New York: Nervous and Mental Diseases Publishing Co. 1931. Pp. 141. $3.

exploration of psychological facts by means of them no longer appears as strange as the opponents of the psychological approach would believe. Organisms work as a whole; and the partial activities of organs are but functions of total reaction; hence integration is always a process of subordination and internal readjustment. This process is most clearly seen at psychological levels. Acceptance of this leads to a more dynamic conception of disease, not as something coming from without to attack the subject, but as "a manifestation of that interplay between organism and environment when, for the time being, the balance is on the wrong side of the ledger, when the organism, for some reason, is losing out." On these lines, Prof. White traces the development of the Self, its organism, and its environment, and in many respects his views are a philosophic restatement of the later writings of Freud. Thus the psychic factor in disease is not difficult to understand, in that physical and mental events are themselves subordinated to the total gradient of the organism. Prof. White has presented us with an essay which must be seriously pondered by all who would see psychiatry as a study of disordered function and maladaptation, rather than as a collection of isolated mental curiosities. Physicians with his wide outlook are all too rare in medicine.

AIRPORT MEDICAL SERVICE.

THE introduction of air travel, both passenger and commercial, has brought with it an entirely new series of sanitary problems. The rules which govern seaports satisfactorily can no longer protect a country from epidemic disease when a journey that used to take four or five weeks can be made in a few days. Insects that would soon have died on a ship can be brought living by aeroplane, and passengers incubating almost any disease can be landed in this country. A paper on this subject was read by Dr. A. Massey at the Eastbourne meeting of the British Medical Association (see p. 591 of this issue). In the subsequent discussion, Sir Malcolm Watson declared that the biggest sanitary problem of the world at this moment was the possibility, entirely the result of air travel, that the yellow fever mosquito would be carried across Africa to the east coast, and thence to Asia. He envisaged a complete collapse of our civilisation if this should come to pass. Colonel S. P. James has recently stressed the need for prophylactic rules.[1] The Office International d'Hygiène Publique is considering the whole problem, and has already drawn up a provisional air convention; perhaps the most complete regulations enforced in any country at the present moment are the United States immigration laws and rules of Jan. 1st, 1930. At present England is protected only by the old Aliens' Order of 1920, which applies to both sea- and air-borne passenger traffic, but which, obviously, cannot meet the peculiar difficulties of air travel. The pressing factor in an airport is the saving of time; passengers have come by air because they are in a hurry, and any attempt to detain them at Croydon, for instance, would dislocate the traffic arrangements and annoy everybody concerned. Filing past a medical officer is not an effective method of detecting the early stages of communicable illness. Although for a thorough medical inspection a whole-time medical officer is essential, yet the work—with the uncertainty of times of arrival, the small number of passengers on any one machine, and the long periods of idleness—would not be likely to attract the services of a keen and competent man. Dr. Oscar Holden, the medical officer of health for Croydon, discusses these difficulties in a recent article[2] and suggests that the best way of meeting them is to insist on reliable medical certificates of physical fitness at the port of embarkation, and on the recognition of certain specified aerodromes in each country as "customs aerodromes," having attached to them a medical officer and bacteriological and isolation facilities. Aeroplanes should carry clearance certificates, especially when coming from scheduled areas, showing that they have been inspected and fumigated for vermin and disease-carrying insects. These three proposals were also put forward by Dr. Massey, who made the further suggestion that stringent international rules should prohibit the voidance of refuse from aircraft over land. Dr. Holden thinks that surveillance would be a valuable addition to the regulations; passengers coming from areas where cholera, plague, yellow fever, typhus, and small-pox are endemic should be allowed to proceed about their business after disembarkation, provided they supply the medical authorities with a list of the areas which they will visit and, if possible, their exact addresses; the local medical officers of health could then be put on the alert. Dr. Holden thinks that the best fumigant for aircraft is hydrocyanic acid gas, since it is toxic and cheap, does not damage fabric or metals, and is so diffusible that it is not likely to reach a dangerous concentration in the open air. Seaport authorities recognise that disease is far more likely to be carried by steerage passengers than by first-class travellers; up to date, the entire passenger traffic of the aeroplane has practically been "first-class." Obviously, this distinction will not last for long, and it seems urgent for the proper authority to think out the regulations which will be necessary to keep this country as free from imported disease in the future as it has been in the past.

[1] See THE LANCET, 1931, i., 315.

[2] Jour. State Med., August, 1931, p. 457.

SOCIETY FOR THE STUDY OF INEBRIETY.—The fourteenth Norman Kerr Memorial Lecture will be delivered by Lord Brentford on Oct. 13th, at 4 P.M., in Friends House, Euston-road, N.W. The subject will be How the Alcohol Question Concerns the Duties of the Home Office.

CHARTERED SOCIETY OF MASSAGE AND MEDICAL GYMNASTICS.—The annual congress is this year being held in London from Sept. 29th to Oct. 3rd. The annual dinner of the society will take place on Oct. 2nd, at 7.30 P.M., at the Connaught Rooms, Kingsway, London.

CAMBRIDGE UNIVERSITY PRESS: EXHIBITION.—On Sept. 22nd an exhibition representing the publications and history of the Cambridge University Press will be opened by General Smuts in the Old Court House at Messrs. J. and E. Bumpus's bookshop in Oxford-street. The publications to be found in the current Cambridge catalogue, some 4000 volumes, will form the main part of the exhibition, but there will be an historical exhibit illustrating the history of the University Press, and the development of printing craftsmanship at Cambridge since 1521. This exhibit will comprise documents from the archives of the press, and a collection of old books covering the four centuries of Cambridge printing; it will include works by Erasmus, James I., Milton, George Herbert, Donne, Fuller, William Harvey, and Sir Thomas Browne, and more recent famous books, all of which were first printed at Cambridge. The exhibition will coincide with the centenary meeting of the British Association, and the range of scientific works in the Cambridge catalogue makes it suitable that the president of the meeting, who is himself a Cambridge man, should perform the opening ceremony.

PANEL AND CONTRACT PRACTICE

SICKNESS CLAIMS.

A REPLY TO MEMO. 329 I.G.

A SECTION of the Paddington Medical Society has been considering the memorandum on certification of incapacity for work issued by the Ministry of Health in June last. The section started from the basis that any reply to the charges contained in this memorandum must have regard to the following points :—

1. The fact, or otherwise, of an increase of illness.

2. The truth, or otherwise, of the statement that the increase in claims has been mainly, and disproportionately, in illnesses of short duration ; and if true, the justification or lack of justification for such an increase in claims.

3. The extent to which the differences of opinion between R.M.O.'s and practitioners are due to the variation in the standards of fitness for work applied by practitioners and R.M.O.'s, or the impracticability of applying certain tests under the exigencies of treatment and in actual practice, e.g.,

A patient with scabies not "unfit for work" is unable to work in consequence of necessary treatment and hygiene.
A clerk required to attend hospital daily for physiotherapeutic treatment on account of sciatica is unable to work in consequence of such treatment.

4. The financial capacity of the funds in relation to actuarial forecasts, as well as the actual incidence, of sickness and certification.

The section of the society considers that the actuarial basis of the funds should be founded, inter alia, on the consideration that, as a matter of treatment or of practical usage, it may not be always desirable that persons recovering from illnesses of medium or short duration should be certified "fit" in the middle of a working week.

5. The soundness, or otherwise, of the statistical bases of the memorandum.

CAUSES OF INCREASED CERTIFICATION.

In the opinion of the Paddington section the cause of increased certification is only to be found to a small extent in "laxity" on the part of doctors, but rather in (1) increased sickness ; (2) unemployment and economic factors ; (3) earlier recourse to doctor ; (4) increasing appreciation of the services of the insurance practitioner ; (5) increasing knowledge of the medical and sickness benefits of the Acts ; (6) collateral evidence and pressure of friends and relations in respect of subjective symptoms complained of by patients ; (7) opinions or certificates of incapacity provided by hospital out-patient departments, or by private medical practitioners, or by consultants ; and (8) the changed outlook of the public as to its "rights."

The outlook of the public as to its "rights" has changed a great deal since the introduction of national health insurance. It is suggested that some of the "pressure" exerted by patients is due to political and social theories concerning the responsibility of the State for their economic troubles, as well as their physical ailments. That an increase in the amount of sickness has actually taken place is borne out by the figures of attendances on panel patients, which have risen in recent years from between three and four in a year to between five and six.

The memorandum, it is remarked, gives no figures to show the degree to which practitioners generally are endeavouring to meet an admittedly difficult situation, both as to the number of claimants actually found fit by the practitioner and the number referred by practitioners themselves to R.M.O.'s and of the results. Neither are figures given showing the number who, having been certified as fit for work by the R.M.O., do not resume work, and do not appeal, but forego their benefit. Paddington would like to have figures showing the number who still remain unfit after having been certified as fit by the R.M.O.

BENEFIT OF THE DOUBT.

Much depends, it is felt, upon the definition of "incapable of work." In cases where the patient has been given the benefit of the doubt by his doctor the doctor may feel that, as far as objective symptoms are concerned, the patient is fit. He is bound, however, to take into consideration the subjective symptoms, the patient's feeling of unfitness, and also the patient's knowledge as to the amount of energy output required by his particular occupation.

In giving the patient the benefit of the doubt in such cases the doctor may well feel that in attempting to secure the complete recovery of the patient he is acting in accordance with the spirit of the Insurance Acts. In considering it safer to keep a patient at home a little longer the doctor is probably influenced also to a certain extent by the comments of coroners and other privileged persons when untoward and unfortunate consequences have resulted from a premature cessation of medical supervision or a too early resumption of work.

The teaching of modern clinical medicine is that disease may be revealed at its earliest stage—the stage where treatment may be most successful—by symptoms only, and this is confirmed by practical experience. It seems probable that during the years in question a similar increase would be found in the number of X rays taken in hospitals for trivial injuries, the cases having been referred to the hospital by general practitioners who were morally certain there was no bone injury, but were, for reasons already given, playing for safety.

TRANSITION PERIOD IN RECOVERY.

From a purely clinical aspect there is no sudden change in a patient's physical condition such that he is "unfit for any work" prior to the change, and "fit for any work" immediately after it. Rather can the complete recovery of a patient be divided into three phases, which may be regarded as analogous to the changes in the lights of a traffic control system, the "stop at home" period being separated from the "go to work" stage by a transition period where caution is the watchword. Failure to recognise the significance of this convalescent or transition period seems to the Paddington section to be at the root of the failure of the memorandum to come to conclusions which will be accepted by the general practitioner as justifiable.

During this transition period a return to work may be possible but inadvisable. Doctors and other professional men whose personal services may be urgently required may find it imperative to return to work after an illness as soon as the previous period of incapacity has come to an end. Beyond the first few days, when their work may seem to be more arduous than usual, no bad effects may be felt at the time, and there will seldom be any of the relapses referred to in § 27 of the memorandum. In the case of patients, however, the certifying practitioner will probably keep in mind that any bad results

occurring at a much later date may be attributed to the too early resumption of work after an illness.

PREVENTION OF DISEASE.

Does not the fact that the increase in number of claimants has been mainly in claims of short duration and among younger insured persons, and the fact that the increase has been in the number of claimants per cent. of society members (§ 17 of the memorandum) tend to show that more advantage is now being taken, especially by the younger insured persons, of the facilities provided for them by the Act? They come earlier, more often, and for slighter complaints, thus perhaps preventing more serious illnesses, and incidentally longer claims. Is not the Act in this way fulfilling one of its objects, about which we hear too little—the prevention of disease? The benefits of the treatment of such conditions as septic foci, which may not render an insured person incapable of work, will be apparent in later years.

The tendency of persons incapable of work, who would not have claimed in earlier years, to claim under present conditions is regarded as a large factor in the increase. There is also a tendency on the part of insured persons to make full use of certificates obtained instead of adhering to their previous attitude of indifference to them, which often resulted in certificates being either refused, torn up, or allowed to lie about at home or in the pocket and thus rendered valueless.

RECOMMENDATIONS.

Study of the memorandum finally leads the Paddington section to make the following suggestions:—

1. To recast the actuarial basis and of sickness benefits according to the health categories and statistics of the various classes of insured persons.

2. To instruct the medical student in health insurance practice.

3. To deal with each case on its merits in the spirit of Article 3 of the N.H.I. (Medical Benefit) Amendment Regulations, 1930.

4. To promote a due sense of professional responsibility in certification, among those in whom it is at present lacking, by general discussions (§ 61 of the memorandum) within the profession.

5. To deal with cases involving negligent or false certification, for purposes of administrative inquiry, through the panel committee and the regional medical staff, and, for purposes of disciplinary action or penalty, through the General Medical Council.

6. To submit any document which reflects on the efficiency or good faith of insurance practitioners before issue to the representatives of the profession for their comments.

COST OF MEDICAL SERVICE IN 1930.

The twelfth annual report of the Ministry of Health which has just appeared (Cmd. 3937. 5*s*.) gives the extent and cost of the insurance medical service in 1930. In England 14,700 doctors were in insurance practice. Medicines and appliances were supplied as part of medical benefit at about 9000 chemists' shops. The number of insured persons entitled to medical benefit was nearly 14,500,000. Medical benefit cost over £8,862,000. Of this sum insurance doctors received over £6,447,000 in respect of their duties of attending and treating insured persons; and £1,927,700 of the balance was paid to insurance chemists for the supply of drugs and appliances. The remainder was expended in adjustments of the main finances of medical benefit to various special conditions arising under the Act, or in the circumstances of insurance practice.

About £200,000 was paid to country doctors on account of mileage, the payments being so calculated as to take account both of distances covered and of the difficulties of locomotion in certain areas which would make distances by themselves an inadequate measure of demands upon doctors' time and energy; nearly £10,000 was set aside to enable country doctors to attend courses of post-graduate study, and to provide them with facilities such as maintenance of telephones, motor-cars, and branch surgeries, or reasonable vacations; doctors received about £196,000 for medicines and appliances supplied by them personally, and for medicines dispensed by them in country districts where patients are out of reach of chemists; and, finally, sums of about £74,000 and £7500 were paid on account of the small numbers of insured persons who exercised their option to obtain treatment, including medicines, through approved institutions, or, with the consent of insurance committees, to make their own arrangements for medical treatment.

On April 1st last 926 insurance practitioners were under agreement with Welsh insurance committees. Of these 29, or 3 per cent., were medical women, representing about 20 per cent. of the registered medical women resident in Wales. The medical men participating in insurance practice were about 55 per cent. of the registered medical men in the country. The central practitioners' fund available for remuneration in Wales amounted in 1930 to £399,229, plus £38,300 allocated in respect of mileage, and £590 to meet certain difficulties in providing medical treatment in rural areas. Medical benefit and administrative expenses together amounted during 1930 to £579,924, as compared with £585,031 in 1929.

THE SERVICES

ROYAL NAVAL MEDICAL SERVICE.

Surg. Comdrs.: O. D. Brownfield to *Egmont*, for R.N. Hospital, Malta; and C. M. R. Thatcher to *Victory*, for Haslar Hospital. Surg. Lt.-Comdr. J. M. Sloane to *Vivid*, for R.N. Hospital, Plymouth, and to *Keppel*. Surg. Lt.-Comdr. (D) E. R. Longhurst to *Maine*. Surg. Lts.: G. Rorison to *Pembroke*, for R.M. Infirmary, Deal; E. W. Graham to *Adamant*; H. G. Wells to *Godetia*; and D. C. Drake to *Enterprise*. Surg. Lts. (D): L. F. Fairey to *Devonshire*; H. V. Pell to *Victory*, for R.N. Barracks, Portsmouth, and to *St. Vincent*; and L. V. Donegan to *Pembroke*, for R.N. Barracks, Chatham.

Surg. Lt. R. W. Mussen to be Surg. Lt.-Comdr.

Surg. Capt. J. McCutcheon placed on Retd. List.

ROYAL NAVAL VOLUNTEER RESERVE.

Surg. Lt.-Comdr. H. M. Petty, Surg. Lts. A. P. Trimble, D. M. Dean, and Surg. Sub-Lt. R. W. Riddle to *Victory*, for Haslar Hospital. Surg. Lt. (D) R. Symmons to *Vivid*.

ROYAL ARMY MEDICAL CORPS.

Basil Blewitt to be Lt. (on prob.).

MILITIA.

Maj. R. MacKinnon retires on attaining the age limit, and retains the rank of Maj.

TERRITORIAL ARMY RESERVE OF OFFICERS.

Capt. D. C. Graham, from Active List, to be Capt.

INDIAN MEDICAL SERVICE.

The undermentioned officers retire: Col. J. Fuller-Good and Lt.-Col. E. C. Hepper.

Capt. A. S. Arora relinquishes his temp. commn.

ROYAL AIR FORCE.

Group Capt. H. W. Scott to No. 21 Group Headquarters, West Drayton, for duty as Senior Medical Officer.

SPECIAL ARTICLES

NOTES FROM INDIA.

(FROM OUR OWN CORRESPONDENT.)

OPIUM AND ALBUMINURIA.

THE Calcutta School of Tropical Medicine is investigating the effect of opium on albuminuria, having regard to the general impression that patients suffering from kidney disease stand this drug badly. There appears to be no experimental basis for this belief, but it has been argued that the administration of opium or its alkaloids is inadvisable in nephritis, if only because they lessen intestinal movements, apart from any question of direct action on the kidney. Lieut.-Colonel R. N. Chopra, I.M.S., and Dr. J. P. Bose, however, approaching the question with an open mind, did not admit [1] that any adequate reasons were forthcoming for depriving patients suffering from chronic kidney disease of the relief from pain or distressing cough or pain afforded by opium. They proceeded to try the effect of small or medium doses on a series of hospital cases, some suffering from chronic nephritis of the parenchymatous type, some with ascites, and all with albumin in the urine indicative of damage to the kidneys. The patients were put on a diet of known food value, and the amount of fluid was kept as constant as possible. The daily output of urine and albumin was measured and charted. Opium was given in gradually increasing doses in the form of a mixture, the initial dose being gr. 1 daily, gradually increased to 4 or 5, or in some cases to grs. 8 or 9 daily. Contrary to expectation, in almost all cases there was an appreciable increase in the quantity of urine passed, and in none was the daily output diminished below the average normal. This was attributed, not to direct action on the kidney, but to diminished peristalsis increasing absorption from the gut. The quantity of albumin showed a decrease in most cases; in some it disappeared. There was no evidence, either in increase of albumin or casts, of further damage to the kidney. The blood-sugar in most cases remained constant as before. The general condition of most of the patients improved, but in two slight symptoms of uræmia developed. The number of cases dealt with was only 12, and renal function tests were for some reason considered impracticable The further investigations promised will be awaited with interest.

SELF HELP.

In a report issued jointly by the Dufferin Fund, the Victoria Memorial Scholarship Fund, and the Lady Chelmsford All-India League, is an account of the inquiry into maternal and infant mortality now being carried on by Dr. Margaret Balfour and her colleagues in various parts of India. This inquiry is complicated by social and religious customs, and by the geographical distribution of various diseases of pregnancy, such as eclampsia, anæmia, and osteomalacia. Certain broad facts indicate directions in which effort can be profitably put forth. A series of 200 cases of stillbirth and early infantile death have recently been examined in Bombay, Calcutta, and Madras. Of these, the complications of labour comprised the largest single group, accounting for 19·5 per cent. Antepartum hæmorrhage provided 13·5, and the toxæmias of pregnancy 15·5 per cent. Only 10·5 per cent. of the deaths were put down directly to tropical diseases, those figuring chiefly being malaria, anæmia of pregnancy, and dysentery. The incidence of syphilis was 14·5 per cent., or including probable and possible cases 18·5 per cent. It is noted that whereas women of the hospital classes in Glasgow gave 9 to 10 per cent. of positive Wassermann reactions, series of women examined in Bombay, Madras, and Calcutta gave 13·6, 12·5, and 13·4 respectively. Out of a total of 144 placentas examined, no fewer than 57 showed evidence of gross disease or abnormality, and 5·5 per cent. of the deaths were accounted for primarily by diseases of the placenta. Much of the report of the Scholarship Fund is devoted to the question whether or not it is desirable to utilise the services of *dais* (the illiterate midwives of the country) for maternity work. By general agreement these women, in their original state, are dirty and dangerous, and it is difficult to imbue them with even the most elementary ideas of cleanliness and efficiency. In some localities, however, an attempt at training has been made by enthusiastic workers, with a considerable measure of success. The work of educating them may be distasteful and unsatisfactory, but there is no practicable alternative. Properly trained midwives are not likely to be available for many years to come, apart from the difficulty of prevailing on them to reside in isolated situations. The cognate scheme for training schoolteachers to render elementary medical and surgical aid in the villages is advancing rapidly in many districts. It certainly seems wise to avoid utilising the *vaids* and *hakims* for this purpose when literate substitutes are readily obtainable. And it is evidently with reluctance that women doctors have at length decided to endorse comprehensive schemes for the training of indigenous *dais*.

[1] Ind. Med. Gaz., June, 1931.

UNITED STATES OF AMERICA.

(FROM AN OCCASIONAL CORRESPONDENT.)

DIFFERENTIAL FERTILITY.

A STUDY of fertility according to geographic areas in this country has been made for the division of research of the Milbank Memorial Fund, and is published in their latest Quarterly Bulletin. Race, social class, and urbanisation, each known to affect fertility, were held constant for each area. In the East the fertility-rate of women on farms is found to be about 50 per cent. higher than that of women in cities. In the West the farm women are 75 per cent. more fertile. Women of the "white collar" class have a higher fertility in the West (except in California) than in the East. Among women of the labouring class this distinction is not found. In fact, the highest fertility among women of this latter social grouping is found in New Jersey and Pennsylvania. The labouring class is more fertile in all areas than is the "white collar" class. It is suggested that further research be made to determine what are the social factors responsible for the higher fertility in Western areas and for an observed tendency toward stabilisation of fertility in urban areas.

THE BROAD TAPEWORM.

As long ago as 1907 Stiles foretold that infestation with *Diphyllobothrium* (*Dibothriocephalus*) *latum* would become endemic in North America, as it already is in Japan and on the coast of the Baltic and the great

African lakes. Infested fish have been found in Northern Minnesota, the Portage Lake region of the State of Michigan, and in the vicinity of Winnipeg. This tapeworm undoubtedly has been introduced by immigrants from Northern Europe. During the last five years Thomas B. Magath and Hiram E. Essex, of the Mayo Foundation, have made a detailed investigation of the waters of Minnesota and the neighbouring territory of Canada, and have tabulated and plotted their findings in a contribution to the *Journal of Preventive Medicine* for July. More significant than their actual discoveries of plerocercoids are the observations they have made upon the life cycle of this helminth under natural conditions. Much emphasis has been laid in the past upon the importance of dogs and certain wild mammals as natural reservoirs of infestation. Magath and Essex give reasons for believing that human sewage is of far greater importance. Of eggs from human sources, 80 per cent. developed active coracidia. The percentage of active coracidia developed from eggs taken from the fæces of dogs was only 1·5. Moreover, drying is found to destroy the embryo, which would still further reduce the significance of canine fæcal matter. These conclusions are confirmed by observation; for heavy infestation is associated not with the presence of dogs upon the shore, but with the discharge of raw sewage from communities where the habit of eating raw fish has been shown to persist. It would appear probable that the control of infestation is reasonably attainable, and that a major part of the programme of rational control would consist in chlorination of raw sewage from infested communities.

SANITARY DRINKING.

The Women's Bureau of the Department of Labour has just published a study of the laws governing the installation of drinking facilities and the present standards in 21 States. They feel justified in making this piece of public health research by the instruction received from Congress that they are to formulate standards to improve working conditions for women. After supplying ample evidence that a drinking fountain should have an inclined and not a vertical jet, and that the orifices of the jets must not be accessible to the mouths of drinkers, the Bureau's publication [1] shows that many old-fashioned insanitary types of drinking fountain are not only in use, but are still being installed. Among 1500 places of employment studied, only 4 per cent. had sanitary fountains for all their workers. Less than 15 per cent. had any drinking fountains of a satisfactory type. Investigation of the State laws shows that only 17 States definitely recommend that angle jet fountains be used in preference to the vertical jet type.

[1] Correll, Marie: Sanitary Drinking Facilities, Bull. of Women's Bureau, No. 87. Washington, 1931. 10 cents.

BERLIN.

(FROM OUR OWN CORRESPONDENT.)

THE TREATMENT OF PUERPERAL FEVER.

Dr. Ziegler reports the result obtained in the treatment of puerperal fever in the gynæcological department of the Virchow Hospital with a new compound, euthagen, said to be a silver salt of thiozellobiose. The special feature of that compound is that the silver salt when it comes into contact with the blood plasma is very slowly dissociated, so that it can act on the blood over a considerable time. The preparation was used in 44 cases, of which 5 died within the first five days; in 11 cases the septicæmia was complicated by endocarditis and peritonitis, and euthagen could not be expected to give good results. Eighteen of the remainder recovered, whilst in 10 cases the drug proved useless. The women when conveyed to the hospital had all had several rigors with very high temperatures, and were in a very bad condition. Intravenous injections of 5 c.cm. of a 5 per cent. solution of euthagen were given every other day. In some cases which were eventually cured 100, 80, and 60 c.cm. of the compound had been administered The injections produced neither pain nor thrombosis. The remedy appears to be worth a trial, since the results recorded above were obtained in patients who seemed to be in a desperate condition when they reached hospital.

THE EFFICACY OF MEAT INSPECTION.

The efficacy of meat inspection has recently been discussed in the lay press in connexion with an alleged increase of trichinosis in this country. Prof. Bongert, of the Berlin Veterinary College, stated, in reply to the attacks on meat inspection, that from 1925 to 1929 only 129 cases of trichinosis were notified in Germany with 16 deaths. In 1930 alone there were 95 cases with 11 deaths, the increase being due to an epidemic in Stuttgart traced to the consumption of bear-ham, which is not subject to inspection. During recent years 7,000,000 pigs had been inspected in Berlin by the Government meat inspectors; 70 of these were found to be infested, and might have caused epidemics if not condemned. Between 1905 and 1911 one pig out of 14,000 showed trichinæ, but in 1930 only one out of 67,000, notwithstanding the importation of foreign pigs. In cases where trichinosis has occurred after the consumption of pork it must have been due to a deficient inspection. The importation of tinned meat from abroad being illegal, the risk of disease from meat consumption is very small in this country.

EXAMINATION OF ICE-CREAM.

In the city of Magdeburg, paratyphoid fever having become rather prevalent, the ice-cream sold on the streets has been subjected to examination by the municipal health authorities. The head of the department concerned, Dr. Schäde, reports that 31 samples were received and showed from 1000 to 280,000 bacteria per c.cm. No paratyphoid bacilli were found, but only lactic acid bacilli, *Bacillus proteus*, and innocuous streptococci; in some samples *B. coli* was also present. The ice-cream was found to consist of milk, sugar, fruit juice, and owing to the large quantity of bacteria present fermentation took place at a temperature as low as 6–8° Centigrade. Dr. Schäde points out that of all countries Holland alone insists on the routine inspection of ice-cream. There no ice-cream may be sold having more than 100,000 bacteria per c.cm. He suggests that a similar law should be enforced in Germany.

LYMPHOGRANULOMATOSIS.

Attention is again being drawn to the morbid condition known as lymphogranulomatosis, described by Dr. Frey, on which I commented last year.[1] In the department for skin diseases of the Virchow Hospital 51 cases have been under the observation of Dr. Lobe and Dr. Blummer; in 49 of them the Frey test was positive. In the course of the illness a swelling of the inguinal and iliac glands develops.

[1] See THE LANCET, 1930, i., 937.

Lymphocytosis is a constant symptom. In many cases an exanthem in the form of urticaria or of a maculo-papular rash. The authors observed good results following intracutaneous injections of tuberculin. Operative removal of the glands takes a long time, the wounds healing badly, while radiotherapy gives no result.

MALARIAL INFECTION OF SYPHILITIC INFANT.

Dr. Schadow, of Hamburg, has recently described a case where a woman suffering from general paralysis treated by induced malaria gave birth to an infant in the eighth month of her pregnancy. No clinical symptoms of syphilis were present in the infant, but since the Wassermann reaction was positive the infant was treated with inunctions of mercury iodide ointment. Three weeks later pyrexia developed in form of tertian ague, the infant became gravely ill, the spleen being greatly enlarged. Examination of the blood showed a severe anæmia and the presence of malaria plasmodia. After administration of quinine and two transfusions of blood the infant recovered, and when seen after a year was strong and healthy.

THE ROBERT KOCH ANNIVERSARY.

In 1932 fifty years will have elapsed since Robert Koch discovered the tubercle bacillus, and plans are being made to celebrate his memory. The Robert Koch Fund for scientific research which had dwindled almost to extinction through the inflation of our currency will be revived. President Hindenburg has declared his readiness to become patron of the celebrations, which will take the form of a meeting at which foreign as well as German scientific men will be invited to deliver addresses, and the Chancellor will be honorary president.

SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

THE REGIUS CHAIR OF FORENSIC MEDICINE, GLASGOW.

THE resignation of Prof. John Glaister, M.D., Regius Professor of Forensic Medicine in the University of Glasgow, takes place on Sept. 30th. He has held the chair since 1898, having previously held a chair of medical jurisprudence and public health at St. Mungo's College, Glasgow. His whole life has thus been spent in the furtherance of medico-legal knowledge, and his classical text-book on the subject has reached a fourth edition. As medical referee for industrial diseases in six counties in Scotland, and as medico-legal examiner in Crown cases, Prof. Glaister has exercised a profound influence on the development of his subject, which extends throughout the British Empire. It is appropriate that the vacancy caused by his resignation, at the age of 75, should have been filled by the appointment of his son who has specialised on the same lines. John Glaister, jun., M.D., D.Sc., has been professor of forensic medicine in the University of Egypt, Cairo, and medico-legal adviser to the Egyptian Government since 1927. He qualified in 1916, and from 1916–19 served with the Royal Army Medical Corps. After the war he was appointed assistant to the professor of forensic medicine at Glasgow University. He qualified as barrister-at-law of the Inner Temple, London, and was called to the Bar in 1925.

Dr. Glaister has made numerous contributions to medico-legal literature, of which the most recent is a substantial work, published in Egypt this summer, entitled "A Study of Hairs and Wools." This book, which is profusely illustrated, embodies the results of his researches, extending over many years, on the medico-legal aspects of its subject.

A NEW HOSPITAL AT RHYNIE.

The late Dr. P. Nicoll, of Stratford, E., bequeathed £5000 for the establishment of a hospital for his native place, Rhynie, in North-west Aberdeenshire. The bequest was supplemented by gifts in money and kind, and the building was recently opened by the Duchess of Richmond and Gordon. It consists of four double and two single wards.

SUNDAY TENNIS IN HOSPITALS.

The resident medical staff at Stobhill Hospital, Glasgow, have asked permission to play tennis at that institution on Sundays after 2 P.M. The Glasgow Corporation Subcommittee on Institutions, by four votes to three, refused to recommend that the permission be granted, and the Health Committee finally refused the request by eleven votes to nine.

INFECTIOUS DISEASE

IN ENGLAND AND WALES DURING THE WEEK ENDED AUGUST 29TH, 1931.

Notifications.—The following cases of infectious disease were notified during the week: Small-pox, 33; scarlet fever, 1452; diphtheria, 759; enteric fever, 63; pneumonia, 341; puerperal fever, 31; puerperal pyrexia, 97; cerebro-spinal fever, 24; acute poliomyelitis, 14; acute polio-encephalitis, 1; encephalitis lethargica, 12; dysentery, 9; ophthalmia neonatorum, 122. No case of cholera, plague, or typhus fever was notified during the week.

The number of cases in the Infectious Hospitals of the London County Council on Sept. 1st–2nd was as follows: Small-pox, 33 under treatment, 2 under observation (last week 27 and 0 respectively); scarlet fever, 1091; diphtheria, 1351; enteric fever, 15; measles, 132; whooping-cough, 377; puerperal fever, 22 (plus 15 babies); encephalitis lethargica, 214; poliomyelitis, 8; "other diseases," 89. At St. Margaret's Hospital there were 16 babies (plus 10 mothers) with ophthalmia neonatorum.

Deaths.—In the aggregate of great towns, including London, there was no death from small-pox, 1 (1) from enteric fever, 6 (0) from measles, 1 (0) from scarlet fever, 19 (3) from whooping-cough, 30 (6) from diphtheria, 39 (9) from diarrhœa and enteritis under two years, and 15 (2) from influenza. The figures in parentheses are those for London itself.

Two deaths from whooping-cough were reported from each of Liverpool, Bradford, and Hull. Liverpool reported 9 fatal cases of diphtheria, Hull 2. Diarrhœa was credited with 5 deaths at Liverpool, 4 each at Nottingham and Leeds, 3 at Hull.

The number of stillbirths notified during the week was 265 (corresponding to a rate of 38 per 1000 births), including 49 in London.

KING GEORGE HOSPITAL CONTRIBUTORY SCHEME.—This new Ilford hospital is about to establish a contributory scheme on the basis of a weekly payment of 2*d.*, supplemented by an employers' quota. The limits of the qualifying weekly income will be: single men or women, £4; married, without children, or with children over 16, £5; married, with children under 16, £6.

A NOISE SILENCER FOR HOSPITALS.—Several New York hospitals are said to be installing a new device for excluding noise which has been invented by Mr. Hiram Maxim. The apparatus consists of a box a foot wide and 10 inches high. It is placed on a window-sill and the window closed down to the top of the box, and although a large volume of air is admitted outside sounds are so completely excluded that even the noise of a pneumatic drill is unheard. The apparatus itself makes a noise comparable to that of an electric fan.

PUBLIC HEALTH SERVICES

ANNUAL REPORTS OF MEDICAL OFFICERS OF HEALTH.

THE following are 1930 statistics of Birmingham and Leicester:—

Name of district and estimated mid-year population.	Birth-rate.	Death-rates per 1000 of the population.					Death-rates per 1000 births.		
		All causes.	Tuberculosis.	Cancer.	Respiratory diseases with influenza.	Heart disease.	Infant and neonatal mortality.	Young child (1–5 yr.) mortality.	Maternal mortality from childbirth.
Birmingham. (982,000)*	17·7	10·8	1·03	1·43	1·4	1·9	60/29	20	3·4
Leicester .. (245,200)†	15·8	11·2	1·10	1·51	1·6	1·5	56/29	18	5·4

Registered stillbirths per 100 live births: Birmingham, 4·0; Leicester, 4·6.

* Locally estimated for 1930 (1931 Census population, 1,002,413).

† Registrar-General's estimate for 1929 (1931 Census population, 239,111).

Birmingham.

Dr. H. P. Newsholme states that as the result of the Local Government Act, 1929, the city council has allocated to the public health committee Dudley-road Hospital (850 beds); Selly Oak Hospital (541 beds), both to be used for the reception of the sick and of pregnant women; two convalescent homes; and Selly Oak Infirmary (562 beds), mainly used for the chronic sick. The Lordswood nursery (44 beds), established by the guardians for children up to the age of 2 years, has been transferred to the maternity and child welfare committee. The cottage homes and the boarding out of children have been placed in the hands of the education committee; and Monyhull Colony, with accommodation for 1206 mental defectives, has been transferred to the Mental Deficiency Acts Committee. The administration of domiciliary medical relief remains in the hands of the public assistance committee, whose chief medical officer is Dr. F. W. Ellis, medical superintendent of Dudley-road Hospital. The labour involved in the transfer, says Dr. Newsholme, has been minimised by the admirably efficient state of the institutions transferred and the willing cöoperation of their staffs. For the purposes of Section 13 of the Act the views of the Birmingham Hospitals Council have been obtained.

The general death-rate and the infant mortality-rate during 1930 were the lowest recorded for Birmingham, but Dr. Newsholme points out that there is still much scope for improvement in the mortality figures for early and middle life. Thus at the age-period 5 to 15 the principal causes of mortality were accidents 51, diphtheria 35, and rheumatic fever 27. At the age-period 15 to 25 tuberculosis caused 39 per cent. of the total deaths, whilst next in order came accidents and heart disease. At the age-period 25 to 45 tuberculosis caused 361 deaths, pneumonia 126, and heart disease 102, and at the age-period 45 to 65 heart disease caused 484 deaths, tuberculosis 315, and pneumonia 254. When the central are compared with the outer wards it is found that the death-rates from tuberculosis and pneumonia are doubled and that from bronchitis trebled, whilst on the other hand there is little difference between the two sets of wards in the rates for influenza, cancer, or violence. In the central wards 35 per cent. of those who died had reached the age of 65, whilst in the outer wards the percentage was 43.

Cases of glandular fever numbered 25 and the average duration was from six to seven weeks. Careful inquiry failed to implicate milk, water, or foodstuffs. There were 58 deaths registered from measles, and 412 cases were admitted to Little Bromwich Hospital. In the case of contacts under 5 years of age, who were in delicate health or suffering from some other disease, it was considered desirable to use immunisation methods. Members of the health visitors' staff acted as donors of the serum, and immunisation was carried out on 150 children with excellent results. In some cases prevention was aimed at, and in others attenuation of the attack with resulting active immunity. When a supply of serum is available ward closure on account of cross-infection of measles becomes unnecessary. During the year 4168 children were fully immunised against diphtheria. Medical practitioners are supplied on request with immunisation material, and advantage was taken of this in 28 cases. Of the 69 fatal cases admitted to the isolation hospital 28 were moribund on admission. Among the remainder admission was sought only after the receipt of a bacteriological report in 12 instances. Dr. E. H. R. Harries urges practitioners to rely upon their clinical judgment and give antitoxin upon suspicion. Interesting research work has been carried out with regard to the blood-sugar in diphtheria and in the use of the electrocardiograph. A series of cases treated with insulin and with large doses of antitoxin intramuscularly and intravenously did better than a series which had no insulin. The exact cause of the mechanism of circulatory collapse in diphtheria is being further investigated by Dr. Harries and his staff. Scarlet fever antitoxin continues to give good results in preventing complications, and Dr. Harries has no doubt about the value of antitoxic therapy in the treatment of the toxæmia of erysipelas. It appears to be immaterial whether erysipelas or scarlet fever antitoxin is used.

There were 596 notifications of ophthalmia neonatorum, 485 of which were very mild. In six cases some permanent damage remained—namely, blindness of one eye and defect in the other, both eyes very defective, one eye very defective, and three cases of slight defect in one eye. In 1929 18 clinics for children between 18 months and 5 years were established. They have proved popular, and 12,516 attendances by 6474 children were recorded during 1930. Ultra-violet light treatment is being extended, and during 1930 three more lamps were installed, making a total of 12 lamps for the 28 centres. In January, 1930, a fully qualified teacher of remedial exercises was appointed and six weekly clinics were opened, mainly in the central area, where rickets is most prevalent. In July, 1927, an insurance scheme against the expense of medical aid was begun for cases booked by midwives, the premium being 5*s*. During the last three years the percentage of calls for medical aid among the insured cases was 38, 38, and 44, whilst among the uninsured midwives' cases the percentage figures were 27, 23, and 32. After considering all the circumstances the committee decided to terminate the scheme and it came to an end in June, 1931.

The new by-laws for houses let in lodgings have been applied strictly. As a result 281 of the most unsatisfactory houses have been closed and a marked improvement secured in the remainder. Dr. Newsholme urges that a national effort should be made to prevent exorbitant rentals being charged in these premises. The houses in the city number 230,000, of which 25,236 are owned by the municipality. There are many houses built from 50 to 100 years ago, of the back-to-back type, situated in courts. Few of these have separate water-closets, and large numbers have no internal water-supply. As regards overcrowding, an investigation made in 1930 indicated that there had been a marked improvement

since 1925. The five-year programme involves the demolition of 4700 houses, and the erection of 23,000 houses for new housing.

Leicester.

Dr. C. Killick Millard shows that Leicester, like Birmingham, scored "lowest on records" during 1930—namely, for tuberculosis and infant mortality—while the general death-rate was about on a par with the previous lowest in 1928. Much work was caused by a widespread epidemic of minor small-pox. For the last three years Leicester has had little freedom from this disease. There were 90 notifications in the last half of 1928, 320 during 1929, 1192 in 1930, and 1171 in the first five months of 1931. Only one of the 1192 cases in 1930 proved fatal, a baby of 3 weeks' old, which had not been vaccinated. A woman of 20 admitted to the Royal Infirmary for cerebral tumour had a slight attack of small-pox, but died from the cerebral tumour. One medical practitioner, who showed no vaccination scars, was admitted to the small-pox hospital. Two women developed small-pox during pregnancy. One had the eruption on Oct. 3rd and was confined on Oct. 8th. The baby was vaccinated the next morning; the vaccination took, but a small-pox eruption appeared on the 19th, whilst the vaccination pursued its ordinary course concurrently. The other woman had the eruption on May 8th, and was confined on May 12th the baby was vaccinated on the 13th; the vaccination took, and this child did not develop small-pox. Missed cases still occur, although the public knows better now what minor small-pox is like.

The North Evington poor-law infirmary has been rechristened "The City General Hospital" and transferred to the health committee. The mental and mentally deficient cases were removed to specially designed institutions at Humberstone and Leicester Frith, but the question of removing the elderly persons in poor health, who are not acutely ill, to some other institution has not been settled. The report for the nine months succeeding transfer shows that 1772 patients were admitted, and that the daily average number of beds occupied was 432. There were 92 confinements. The site of the hospital covers 108 acres, and is 336 feet above sea-level. No drastic changes have been made in administration, but additional expense will be needed to transform it into a first-class general hospital. Destitute children of school age have been left in the charge of the public assistance committee and the maternity and child welfare committee has not taken over the care of children below school age.

Inhabited houses number about 63,000, and of the 5477 houses built by the corporation since 1921, 2108 were erected outside the city boundary. Dr. Millard sees no reason why the problem of the slums should not be effectively tackled in real earnest under the 1930 Act, and he welcomes the principle of differential renting, with rent rebates based on the number of dependent children. Hitherto municipal houses have been tenanted by persons considerably above the class who constitute the problem of the slums. Dr. Millard would put the claims of the children first every time, and insists that housing needs rather than ability to pay should be the chief criterion in allocating municipal houses. On the other hand, there are a large number of little old low-rented cottages which could be put into reasonable repair for old people to end their days in. One clearance area was originally brought forward under the Act of 1925 but has remained in abeyance—it has now been confirmed as a clearance area under the new Act. Apart from this, Dr. Millard thinks improvement area procedure is specially suitable for Leicester where the slums are grey rather than black.

Dr. H. Stanley Banks continues to claim very successful results from the intravenous administration of antitoxin in scarlet fever. He finds that the faucial œdema disappears within 12 hours of administration, and thus renders the danger of acute middle-ear disease very slight. The average stay in hospital of cases treated intravenously was 20 days. The complications were mostly trivial but slightly more numerous than in the two previous years, apparently owing to the antitoxin supplied during the second quarter being less potent than formerly. With an increase of the dose the results became satisfactory again. In the treatment of toxic diphtheria Dr. Banks pins his faith to large doses of antitoxin given intravenously, and considers that if late heart failure occurs in diphtheria treated before the fifth day, this is a clear indication that the dose of antitoxin has been inadequate. Suspects admitted to hospital are Schick-tested as an aid to diagnosis, and if the test is positive active immunisation with toxoid without antitoxin is proceeded with. There were nine cases of cerebro-spinal fever, which were admitted late in the disease, having been sent in the first instance to the Royal Infirmary. It was found possible to treat several of the cases by the intensive intravenous serum method with encouraging results. Of the nine cases, six died and three recovered. As in the two previous years, ultra-violet light appeared to be a very successful method in treating erysipelas, as also ionisation in otitis media.

Some years ago the Ministry commented on the large number of pulmonary tubercle cases with no tubercle bacilli in their sputum, and suggested that sputum examinations should be made more frequently. During the last two years the sputum examinations have been more than quadrupled, and the proportion of adult pulmonary cases without tubercle bacilli in their sputum has fallen from 55 to 22 per cent. Dr. Banks has a difficulty in persuading the early cases to stay long enough at the sanatorium, and endeavours to meet this point by monthly lectures to the patients on the nature of their disease. The convalescent seaside sanatorium (22 beds) in Norfolk is proving both popular and beneficial, and the competition to be sent there is an additional incentive to self-discipline among the patients. Dr. Banks thinks early artificial pneumothorax treatment is so successful that it should be a matter of policy to adopt it as a routine in all cases where one-sided disease is found by X ray examination. An important event during 1930 was the opening of an orthopædic and light department at Richmond House for the use, jointly, of the health and education committees. The orthopædic work is under Mr. Leslie Morris, F.R.C.S., who has also been instrumental in introducing many improvements for the benefit of patients at the sanatorium suffering from surgical tuberculosis.

SCHOOL MEDICAL SERVICE.

—	No. on roll.	Average attendance.	Routine inspection.	Special examinations and reinspections	Percentage of defects.
Bristol ..	54,540	48,353	16,221	45,475	24·3
County of Nottingham	55,107	49,009	17,031	26,419	23·49
City of Nottingham	39,801	35,881	11,591	39,054	19·0

Bristol.

IN Bristol facilities for promoting the health of the population of school age are in the main adequate. The high percentage of defects found (24·3) suggests both poor health conditions and a thorough investigation. Coördination of services has been well established with the help of a joint committee. Dr. R. H. Parry is school medical officer, medical officer of health, medical officer to the Public Assistance and Mental Deficiency Committees, and also local inspector to the Blind Persons Act Committee. All

the medical staff of the Council under the direction of the principal medical officer may be called upon to serve any committee. A principal sister has administrative responsibilities over all the outdoor nursing staff of the corporation, including health visitors, home nurses, and school nurses. Towards the end of 1929 several school clinics were made available for pre-school children, and nursing and expectant mothers were admitted to the dental clinics. In the future a joint clinic at the Municipal Hospital at Southmead will serve as a centre for inspection and treatment of minor ailments of school-children and infants under 5; infant welfare clinics and a school for mothers; and antenatal clinics as well as dental, ophthalmic, and ear, nose and throat clinics. New developments in school work include the extension of the scheme for immunisation against diphtheria. Children are now inoculated in the schools instead of at the clinics. In March a clinic was opened at Southey House, College Green, for the investigation of "difficult children," and a certain number of delinquents has also been investigated. The clinic is under the direction of Dr. A. Dalby, who has the assistance of a school nurse for the investigation of environmental conditions; economic conditions have hitherto prevented development of this clinic along definite "child guidance" lines. The opening of the new Winford Hospital with 60 beds for prolonged treatment of cripples and heart disease has extended the good work being carried on under the rheumatic and orthopædic schemes. In nine years the number of cases of ringworm of the scalp have been reduced from 183 to 8 by the use of X rays, under the direction of Dr. F. C. Bergin. Major C. P. Rea, superintendent of physical instruction, regrets that no steps have yet been taken in private schools to bring the physical training more into line with the requirements in council schools. Children entering council schools after a period in private schools are often found to be handicapped through lack of knowledge and poor physique. The provision for exceptional children in Bristol is good, though accommodation for epileptics is, as elsewhere, difficult to find.

County of Nottingham.

Dr. C. Tibbits sets out the shortcomings of the school medical service in the county before chronicling the directions in which progress has been made. He admits, for example, that ascertainment of mental defect must be incomplete, since his service has found only 3 per 1000 of the children to be mentally defective, and it is improbable that Nottingham is particularly favoured in the mental capacity of its school population. Dr. Tibbits believes that in rural areas many cases of aural discharge remain untreated; special sessions in clinics, supplemented in rural areas by a travelling van, are needed. He regrets the lack of accommodation for epileptics, and for the delicate children who would benefit from education in the open air. The needs of the rheumatic child are not yet fully met. In other directions considerable advances have been made. All the treatment schemes are working well, the provision of spectacles having been facilitated, while the new complete dental scheme has been so keenly appreciated by parents that acceptances of treatment have risen to 65 per cent. A comparative table for Nottingham and for England and Wales shows how vigorously dental treatment is being tackled in this county. The scope of the dentist's work is to be increased by retaining in the scheme children whose parents previously refused treatment. An attempt to secure the routine medical inspection of pre-school children is being made. Valuable special inquiries include: a detailed analysis of the present conditions of 35 children who have received in-patient orthopædic treatment and have now left school; a record of the successful treatment of otorrhœa by flavine in glycerin, by Dr. C. W. Jeremiah; a record of the treatment of otorrhœa by ionisation, by Dr. J. Ferguson, whose results in certain cases are even more encouraging. Both authors point out that either of these newer methods is superior to the instillation of hydrogen peroxide.

City of Nottingham.

Dr. A. A. E. Newth says of developments in the school medical service that while some of them are intentional steps and others the results of the growth of scientific knowledge, many others are a response to the demands of teachers and parents.

"It is no part of our work to provide treatment that can be supplied more economically and efficiently by other activities, such as private practitioners and voluntary or public institutions. But where it is found that for various reasons—such as poverty, procrastination or indifference on the part of the parent, lack of accommodation in the homes or hospitals, or of the necessary medical organisation—this essential treatment is not otherwise obtainable, then it is our duty not only to ascertain the defects but to supply the remedies, and to follow up the cases afterwards to make sure that the treatment has been effective."

It is well that these facts should be recalled, since there are still some people who think that there is an inevitable opposition of interest, whereas in reality not only does the national health benefit but actually the increased attention drawn to health matters must lead the parents to seek more advice from their own doctors. The coöperation of all branches of the medical profession is for the good of all, and Dr. Newth specifically adds: "To an increasing extent the school medical service receives the courteous assistance and interest of private practitioners, and of the honorary and resident staffs of the hospitals and dispensaries. In this way the children are enabled to receive the fullest benefit from the medical facilities that are available." An outstanding feature of the past year was the opening of the Leen Side clinic to replace the old treatment centres at Hollowstone and Eastcroft. Of the cases summoned for examination by the surgeon-aurist, 82·3 per cent. attended, compared with 61·7 per cent. in 1929. Probably a factor in the popularity of this department is appreciation of the conservative methods of treatment adopted and of the critical attention given to each patient. Of the cases examined by Mr. H. B. Tawse, the surgeon-aurist, only about 50 per cent. were recommended for operation, the remainder were referred for further observation. Every child summoned for the first examination by the surgeon-aurist is now seen also by the dentist, and, if necessary, treated. The percentage of defects cured in the orthopædic department has greatly increased, while the period of treatment has been reduced. The effective method of dealing with ringworm has reduced the total loss of school attendance from 64,583 days in 1913 to 3678 days only last year. New fields of activity include the supervision of cases of rheumatism and heart disease under the general direction of Dr. J. W. Scott, as part-time consultant physician, and the examination of juvenile delinquents. The lack of a special school for physical defectives is one of the few gaps in a well-organised system; 461 cripples still attend ordinary elementary schools. Excellent features of this report are the section written by the organisers of physical training, a special record of an outbreak of diphtheria, with suggestions for control, and a brief, but judicial, account of some results of ultra-violet ray treatment by Dr. A. J. Davies.

THE SEAMEN'S HOSPITAL.—In 1930 there were 6576 in-patients and 26,167 out-patients; the income was £99,065, and the expenditure £106,241. The board has decided to provide a women's ward of 25 beds, and a children's ward of 20 beds in the Dreadnought, primarily for the dependents of sailors. The hospital will then be recognised by the General Nursing Council as a self-contained school for nurses who will no longer be obliged to take part of their training in a hospital for women and children; the length of their training will thus be reduced, by six months, to three years. The Seamen's Hospital Aid Committee has endowed a twelfth bed at the Dreadnought, making a complete ward.

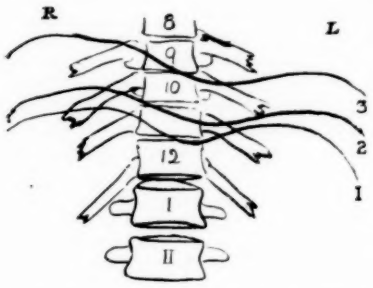
CORRESPONDENCE

THE LEVEL OF THE DIAPHRAGM.

To the Editor of THE LANCET.

SIR,—In my friend Sir Charlton Briscoe's interesting paper on the mechanism of the inflation of the lungs, in your last issue (p. 513), I note he still holds that when a subject lies down the diaphragm at once rises in the chest to such a degree that the respiratory capacity is materially decreased. On this belief he bases theories with which I am not concerned. I am however entirely convinced that this fundamental hypothesis is incorrect. As pointed out elsewhere (*Brit. Jour. Radiol.*, vol. iii., pp. 295–303, and vol. iv., p. 299), I maintain that the accepted teaching as to the behaviour of the diaphragm when a subject lies down is incorrect, in spite of the descriptions given in Gray's Anatomy (eighteenth ed., p. 442). Many observations, largely on healthy medical students, indicate that there is comparatively little change in the normal position of the diaphragm between the upright and horizontal positions. Nature provides an automatic compensatory mechanism so delicate that, even if we go to extremes and invert a subject head downwards, the diaphragm is found at approximately the same level.

In recording the position of the diaphragm it is essential for the X ray tube to be accurately centred for each observation. Moreover skin marks are entirely untrustworthy, for when the recumbent posture is assumed, the skin moves very considerably in relation to the vertebral levels, even in thin subjects. On the anterior chest and abdominal walls this is well recognised, but it is not appreciated that a metal disc attached to the skin over the spinous processes of the vertebræ may be found fully one and a half inches higher in the recumbent than in the vertical position. Skin marks are therefore totally unreliable. Accurate records can only be obtained from radiograms showing the vertebræ. Records must not be made in the prone positions, for if the subject lies face downwards there is, of course, pressure on the abdomen and the diaphragm will, naturally, be found at an abnormally high level.



In the paper already quoted I reproduce tracings of the extremes of inspiration and expiration in the vertical and horizontal (supine) positions and there is practically no difference. That is to say, in the cases I examined, the capacity of the diaphragm to move was just as free in the horizontal as in the upright position. Moreover, the actual range, in relation to the vertebræ, was virtually identical. The accompanying Figure shows the diaphragm "at rest" in an average subject, a laboratory attendant 25 years of age, in its correct relationships to the vertebræ. The outlines are traced from radiograms in which the tube has been correctly centred and exposed in the mid-phase of respiration with the subject (1) standing, (2) lying supine, (3) lying prone. It will be noted that in the prone position (3), the diaphragm is very high in the chest, as high as in the maximum of forced expiration. In such circumstances, one would expect some embarrassment of respiration due to diminished capacity. It is due of course to the transmitted pressure on the diaphragm from the abdominal wall. Our own sensations tell what is happening, especially if we try lying face down after a heavy meal.

When we compare the ordinary positions of the diaphragm in the vertical and horizontal positions, (1) and (2), we note that there is approximately only half an inch difference and this is about the maximum that we find. Quite frequently no difference at all is noted. If, as Sir Charlton maintains, there is a marked diminution in the capacity of the lungs when the subject lies down, some other explanation of this contention must be found, for only a fractional part of it would appear to be due to the altered position of the diaphragm in the chest.

I am, Sir, yours faithfully,

Cambridge, Sept. 7th, 1931. A. E. BARCLAY.

DR. R. M. BUCHANAN'S WORK ON BACILLUS TYPHOSUS.

To the Editor of THE LANCET.

SIR,—To your obituary notice of my old friend, Dr. R. M. Buchanan (THE LANCET, August 29th, p. 509), I should like to add one interesting fact. Some 28 years ago, when the Local Government Board for Scotland was still in existence, and Dr. Russell was still its medical member, a sharp outbreak of enteric fever took place in Glasgow. It was traced to infected shell-fish from a west coast sea loch. This loch was known to be polluted by the sewage of a small town; but this town was a favourite resort of Glasgow trippers at the time of the fair, and, when the tide was down, there was a beautiful expanse of sand, where cockles and mussels were obtainable in marketable quantities. During the fair, there was a considerable amount of acute sickness (due to the shell-fish) at the little town; but the shell-fish sent to Glasgow was accused of originating typhoid fever in the city. I was medical inspector at the time, and Dr. Russell, who was a member of the Royal Commission on Sewage, thought that I might get some light for the Commission on the pollution of shell-fish. I was instructed to visit the place, and to see whether any materials could be found for further investigation.

Cockles were to be had in abundance out of a very grossly polluted area, and I procured, also, some specimens of a siphon-mussel known locally as "mushkin." I believe this was a variety of *Mya arenaria*. I did not verify the point; but the mussel buries itself below the sand, leaving the double siphon open. Several of these I gave to Dr. Buchanan to examine, along with cockles. In his report he gave a series of tests, and claimed to have isolated the *Bacillus typhosus* from one of those mussels. Dr. Russell had assured me that, up to that date, no one had actually found the bacillus in the shell-fish investigated for the Commission. I speak from memory, and, should I overstate, Sir Alexander Houston, who was bacteriologist to the Commission, will put me right. If Dr. Russell's assurance was correct, Dr. Buchanan must have been the first in this country to have demonstrated the presence

of the typhoid bacillus in a mussel. So far as I can remember, he had failed to isolate the germ in any of the other shell-fish examined. The text-books tell us that the *Bacillus typhosus* does not survive long in sewage. If it survives at all, the mussels taken from the particular area would be almost sure to show it. I may add that the sewage of the town flowed direct on to the muddy and sandy shore, and included the sewage of a large asylum.

I am, Sir, yours faithfully,

W. LESLIE MACKENZIE.

Edinburgh, Sept. 3rd, 1931.

A REVOLVING SOLARIUM.

To the Editor of THE LANCET.

SIR,—Having recently visited Aix and been taken over the solarium by Dr. Jean Saidman, I was delighted to see Dr. Menko's letter describing it. Dr. Saidman tests every skin by means of a sensinometer and so avoids that erythema dose which is so common. The direct control and accuracy ensures correct dosage and the perpendicular action of the rays ensures penetration. Every patient's history and diagram of sensitisation is in front of the physician in charge. There is no guess work and no arbitrary timing for exposures. On leaving Aix I went to Cannes and Antibes where sun cures are in fashion. There the dosage is measured by how much exposure the bathers can stand lying on the beach and sitting on rocks. One had a vision of oiled backs, sore backs, and brown backs. The whole idea was wrong, but being a fashion, enjoyment was supposed to be obtained that way. I heard of not a few headaches and people who could not lie down in bed after the burning. If they had only known that browning after exposure protects the skin from penetration by the sun's rays, attempts to secure excessive browning in a short time would have gone out of fashion and the bathers have suffered less.

I am, Sir, yours faithfully,

LENNOX WAINWRIGHT.

Upper Wimpole-street, W., Sept. 7th, 1931.

PYREXIAL TREATMENT OF CHOREA.

To the Editor of THE LANCET.

SIR,—The recent work of L. P. Sutton to which you refer in an annotation last week (p. 545) raises a point of great interest. Of the value of heat-therapy in the treatment of chorea there can be no question. It is, however, permissible to criticise the method by which pyrexia is attained in her cases. In the frolic of unstable functions which characterises the choreic state the mechanism of heat-control and the skin take an important share. If the mouth temperature of the choreic child is taken at frequent intervals it will be found to be almost invariably low, while even more than in the healthy child is it disturbed by trivial causes. This thermal inefficiency and instability are associated with irregularity of sweat-secretion, the usual dry skin of the choreic child being prone to profuse and irregular sweating at night occasioned by trivial or hidden causes.

Probably the value of pyrexial treatment is to be ascribed to correction of this physiological failure of heat-control and to a stimulation of the skin and its sweat-glands. Chorea, in common with other rheumatic disorders, can unquestionably be cured by a combination of artificially induced fever and sweating, but some consideration of the child as an individual must guide us in the choice of the method by which these ends are to be attained. Hesitation must always be felt in giving daily intravenous injections to a child; when the child is nervous and choreic the method savours of brutality. A febrile reaction lasting six to seven hours is therapeutically desirable, but the method of its production appears indefensible. Equally good results can be obtained, though not so rapidly, by the daily use of hot packs or a vapour bath which will raise the temperature two or three degrees for one hour, promote free perspiration and induce mental calm and sleep.

This line of treatment has stood the test of experience and although a cure cannot be promised in eight to nine days as is claimed for the method advocated by Sutton, it can be looked forward to with confidence and without the possible harmful effects upon the mentality of an emotional child and the danger of physical harm resulting from the use of a vaccine between which and chorea no possible connexion can be claimed.

I am, Sir, yours faithfully,

CHARLES E. SUNDELL.

Queen Anne-street, W., Sept. 7th, 1931.

CRITERIA OF CURE IN PULMONARY TUBERCULOSIS.

To the Editor of THE LANCET.

SIR,—I think Dr. Struthers is right (p. 530) to call in question the criterion of cure accepted by the Ministry of Health, on the validity of which his cases throw the gravest doubt—a criterion of cure which apparently they do not wish to accept for any figures but their own which show about a 3 per cent recovery-rate for an annual expenditure of about £10,000,000. I have been trying to get accepted as the official criterion of cure a test which has proved itself in cattle to be at the lowest estimate 95 per cent. correct on post-mortem examination, that is the subcutaneous test with a suitable and entirely innocuous dose of a potent tuberculin. A case which after treatment does not give a focal and general reaction may, for all practical purposes, be considered to be cured just as a cow which receives a subcutaneous injection of tuberculin is scientifically considered by every veterinary authority to be free from tuberculosis, that is, free from any lesion with live tubercle bacilli in it. I would therefore alter Dr. Struthers's last sentence to—Call no man cured of tuberculosis until he ceases to give the subcutaneous tuberculin test.

I am, Sir, yours faithfully,

W. M. CROFTON.

University College, Dublin, Sept. 5th, 1931.

BENDIEN'S WORK ON CANCER.

To the Editor of THE LANCET.

SIR,—As grave misconceptions have arisen as the result of the sensational writing up of a few minutes' telephone conversation by one of the Sunday papers, I should be very much obliged if you will let me make it perfectly clear that I have arranged with Dr. Bendien to carry out certain clinical tests of his work in my hospital practice. This work on my part is purely experimental, and I have no intention whatsoever of using it generally or in private cases unless, or until, I am completely satisfied as to its value.

I am, Sir, yours faithfully,

ROY R. KERR, F.R.C.S. Eng.

Manchester, Sept. 5th, 1931.

OBITUARY

NORMAN M. MacLEHOSE, M.B. Glasg.

Mr. Norman MacLehose, who died on August 30th, while on holiday in Ayrshire, was an ophthalmologist of distinction, although his name was never prominently before the medical profession or the public.

Born at Glasgow in January, 1859, Norman Macmillan was the youngest son of James MacLehose, printer and publisher. Educated at a private school, he entered Glasgow University, studying medicine under Sir William Gairdner and Sir Hector Cameron. After qualifying M.B., C.M.Glasg. in 1882 he held resident posts at the Western Infirmary and the Children's Hospital, and entered on general practice at Sevenoaks, before deciding to take up ophthalmology as a career. In 1885 he took the sanitary science certificate, the equivalent of the present D.P.H., at Cambridge, and spent several semesters in the ophthalmic clinics of Berlin and Vienna, returning to settle in London with a clinical assistantship at Moorfields Hospital. Election soon followed to a post on the staff of the Central London Ophthalmic Hospital, from which he retired as full surgeon in 1907. He joined the Ophthalmological Society of the United Kingdom in 1889, serving on its council from 1902 to 1905. At this time the literary bent which he inherited was seen in frequent contributions to the ophthalmic journals and, what was particularly congenial to him, in his work as editor of the *Ophthalmic Review* from 1891 to 1899. All these things were but the background to a private practice which was at one time very large and remained considerable until he retired from professional life in 1928. It has been said of this side of his work, with obvious truth, that no one who had once been in his hands ever willingly consulted another man. Although something of a recluse, he kept himself in touch with modern developments of ophthalmic medicine, and had a first-rate library on his specialty. For the rest he was widely read and keenly interested in many kinds of field sports, especially riding and fishing. When living at Berkhamsted, as he did before the war, he frequently rode to hounds.

Mr. MacLehose's home was in some ways a centre of books and book-lovers, for his wife was the second daughter of the publisher, Alexander Macmillan, and herself a woman of literary talents, for many years crippled by rheumatism. Their younger son fell in the war.

LOUIS SAMBON, M.D. Naples.

WE regret to record the death of Dr. Louis Sambon, for many years known in connexion with various fields of research concerned with tropical medicine and the ætiology of malignant disease.

Louis Westenra Sambon was of mixed French and English lineage, his mother being a relation of Charles Dickens. He received his preliminary medical education at St. Bartholomew's Hospital, and he went to the University of Naples, his father, Commendatore Sambon, having Italian relations. There he graduated as M.D., and soon after graduation, in 1884, he was one of the medical officers to whom the dealing with an epidemic of cholera in the country was committed. For this work he received medals from both Italian and French Governments. In 1900, when the researches of Manson and Ross had revealed the history of malaria, Sambon and certain colleagues undertook individual inquiries into the occurrence of malaria in the Roman Campagna, where the disease was historically rife, and from this time forward he became an industrious student of tropical medicine, writing on the subject in many journals and lecturing in the London School of Hygiene and Tropical Medicine. One who had attended these lectures writes: "His popularity was seen in the crowded attendance at these lectures, which were patronised not only by students but by most of the teaching staff as well. Dr. Sambon's sense of humour and poetic methods of description brought forth constant applause from his audience."

Sambon's name is closely associated with long but inconclusive researches into pellagra. He studied the disease in Spain and Italy, and with Prof. Chalmers proved the existence of the disease in this country and Scotland. He wanted to make damaging criticisms of the maize theory of causation in the course of his studies, and substituted a parasitic theory, the parasite being spread by biting flies. With great industry he produced geographical and seasonal arguments in favour of the theory, but no parasite was found in definite association with the disease, while it was seen that a food deficiency theory need not rely upon the intake or otherwise of maize only. His later work was mainly directed to the discovery of the cause of cancer, and he expended much industry in the attempt to prove the parasitic nature of the disease. In support of the theory he made an intensive investigation in Italy, constructing maps intended to illustrate the distribution of cancer in that country. This work led him to conclude that sites of local infection existed, and he became convinced not only that areas of prevalence could be discovered, but that certain houses were the definite foci of infection. This was not a new theory, and statistical evidence was not forthcoming for it, while the connexion between these centres of infection and the presence of the vermin who, according to the theory, were the carriers, could not be established. He obtained, however, considerable support for his views, of the correctness of which he always remained certain.

His death occurred suddenly in Paris on August 31st.

THE LATE MR. PATTISON MUIR.

MANY generations of doctors, who have graduated in the University of Cambridge, will join in regretting the death of Pattison Muir, the senior Fellow of Gonville and Caius College, who died on Sept. 2nd at the age of 82.

Matthew Moncrieff Pattison Muir's active connexion with medical education began when, after graduation at the University of Glasgow, he published with Prof. T. E. Thorpe notes on laboratory practice and qualitative analysis. This was in 1879. Then after post-graduate study at Tübingen, he began his long association with Caius College, where there was instituted a series of classes in chemistry designed to meet the needs of those working for the Natural Science Tripos and especially for the medical degree. The classes were not confined to Caius, and Muir attracted immediately a large number of students from all the colleges. He was the most sympathetic of teachers, betraying no impatience in the somewhat thankless task of instilling rudiments, but he was quick to detect those who responded intelligently to his instructions, and became at once their careful and interested guide in more advanced work. A

large number of men will remember that they owe to Muir the encouragement which enabled them to make real progress in the science, and will recall his Scottish accents and his wistful manner, never more wistful than when it accompanied his witty sallies. His notes entitled "Chemistry for Medical Students" were used not only at the large medical school at Cambridge but by students of medicine at every university, and although he won his reputation as a scientific writer by more serious work, it is as the author of those notes that he will be most commonly remembered. In 1880 he was made an honorary M.A. of the University of Cambridge, and in the following year was elected a Fellow of Caius, where for more than 30 years he was Prælector in Chemistry. During this time he wrote a treatise on the Principles of Chemistry, which attained to a second edition, and collaborated with Dr. Charles Slater and with Dr. D. J. Carnegie in other text-books on the subject. In 1894 he became, in collaboration with Dr. Forster Morley, responsible for issuing a new edition of Watts's "Dictionary of Chemistry," and this was a valuable literary performance. The Dictionary had passed through many editions since its publication in 1868, requiring supplements which duly appeared, but by 1894 it required not only revision but largely rewriting. The new issue brought the immense subject up to date, while preserving the clear and readable form of the summaries. A second edition was brought out in 1914, and a third in 1927. The historical side of his science always attracted Muir, and he wrote in a fascinating way not only on the vicissitudes of chemical theories and laws, but on the influence of alchemy, these last studies taking shape in a work entitled "Roger Bacon: His Relations to Alchemy and Chemistry."

Pattison Muir retired from his post at Cambridge in 1910, and lived for a time at Norwich where he pursued his researches into the literary aspects of chemistry, and also became interested in the past intellectual activities of the cathedral city. On these subjects he became a much sought for lecturer, and his studies took shape in 1924 in a volume entitled "Men and Women of Letters in Norwich a Hundred Years Ago," which was of far more than local importance. The memory of Pattison Muir will long be preserved at Caius.

ALBERT EDWARD BRINDLEY, M.D.Lond., D.P.H.

Dr. Brindley, whose death occurred on August 21st at West Bridgford, near Nottingham, had but lately retired from the position of medical officer of health for the borough of Derby, which he had occupied for 22 years. Born at Astbury, Cheshire, in 1865, and educated at Congleton and Manchester Grammar Schools, Dr. Brindley entered Owens College, where he gained the Dauntesey medical scholarship, and later became an Associate. He took a science degree at Manchester in 1886, qualified there in medicine three years later, and went on to take the M.D. Lond. Having gained experience as resident at the Royal Infirmary, as a ship's surgeon, in private practice, and as head of a fever hospital, he became, in 1898, medical officer of health for Bury, until appointed to the post at Derby in 1907. Local health services in the town were then admittedly behind the times, and he set himself with characteristic energy to reorganise them almost single-handed. Shrewdness and determination overcame most of the difficulties, the Health Committee acquiescing even when they felt things were going a little fast for them. Maternity and tuberculosis services work were undertaken when still optional on a sanitary authority. Dr. Brindley was especially alive to the housing needs of Derby, and spent much time in solving the problem of crowded dwellings. In so doing he was greatly helped by the cordial relations which always existed between himself and the medical practitioners in the town. Since 1911 he had been lecturer and examiner in public health at the University of Manchester. Apart from his annual and special reports, which were always worth reading, he wrote a number of articles in public health journals on subjects such as housing, hygienic slaughtering of animals, and the control of tuberculosis.

Dr. Brindley was a keen Freemason, at one time a master of the local lodge at Bury; also for many years a member of the Derby Rotary Club. His retirement last April was the occasion of a presentation by members of the health department, who expressed appreciation of his services to the town and good wishes for his retirement. But his health was too far undermined by the stress of office. He leaves a wife, a son, and three daughters.

PARLIAMENT

THE PARLIAMENTARY SESSION.

THE Parliamentary Session opened with a full House on Tuesday last, Sept. 8th, and in an atmosphere which promised a division of main policy that is to be persevered in relentlessly by two parties. The Royal Message, asking that additional taxes should be instituted and economies effected, led to a general debate on the position. The Prime Minister explained that he had found it impossible to bring the late Government into accord with measures which were, he held, necessary to meet an urgent financial emergency, and Mr. Henderson, as leader of the Opposition, replied that he and his followers found the proposed cuts in social services to be unjustifiable. Mr. Baldwin said that the coöperation of the Conservatives in the task of balancing the Budget would be complete. The period for which the Government would function was discussed, and speakers on each side expressed opposite opinions on the cause and extent of the financial emergency, and therefore on the methods of remedy. The majority of the Government, 59, was understood to be a little larger than was anticipated.

MEDICAL NEWS

Research Fellowship in Radiology.

The British Empire Cancer Campaign has received a gift of £25,000 from Sir William Morris for the establishment of a research fellowship in radiology at Mount Vernon Hospital, Northwood. This hospital, which is now devoted to the investigation and treatment of cancer, is in acute financial distress, half of its beds having had to be closed through lack of funds.

Fellowship of Medicine and Post-Graduate Medical Association.

The following courses will take place shortly: medicine, surgery, and specialties at the Metropolitan Hospital, Kingsland-road, E., from Sept. 28th to Oct. 10th; a similar course at the Prince of Wales's Hospital, Tottenham, from Oct. 12th to 24th. Diseases of the throat, nose, and ear at the Central London Throat, Nose, and Ear Hospital, Gray's Inn-road, from Oct. 5th to Oct. 31st, and including a clinical course, a pathology class, a peroral endoscopy class, and an operative class; and tropical medicine at the Hospital for Tropical Diseases, 25, Gordon-street, from Oct. 5th to 24th. All these courses occupy the whole of each day. A course of lectures for the M.R.C.P. will be held at 8.30 P.M. at the Medical Society of London, 11, Chandos-street, Cavendish-square, on Mondays and Wednesdays beginning Oct. 5th. Further particulars are obtainable from the Fellowship of Medicine, 1, Wimpole-street, London, W. 1.

Hunterian Society.

The presidential address will be delivered by Dr. David Ross at a dinner meeting, to be held at Simpsons' Restaurant, Cheapside, London, E.C. 2, at 7.15 P.M., on Oct. 22nd. The next dinner meeting will be held at the same place and time on Dec. 17th, when Prof. John Eyre, Dr. W. S. C. Copeman, and Mr. C. R. Rudolf will open a discussion on Oral Sepsis. On Nov. 16th a meeting will be held at the Apothecaries' Hall, E.C., at 9 P.M., when a discussion on the Medical Aspects of Crime in Fact and Fiction will be opened by Dr. Norwood East, Dr. Edwin Smith, and Mr. C. J. S. Thompson.

British Science Guild.

The Alexander Pedler Lecture for 1931 will be delivered at 5.30 P.M. on Oct. 21st, under the joint auspices of the University of Durham Philosophical Society and the British Science Guild, at Armstrong College, Newcastle-on-Tyne, by Prof. Irvine Masson, D.Sc. The title of the lecture will be Problems in the Teaching of Science. The Norman Lockyer Lecture for 1931 will be delivered on Nov. 24th, at 4.30 P.M., in the Goldsmiths' Hall, London, E.C., by Dr. H. H. Dale, F.R.S.

Vacancies

For further information refer to the Advertisement columns.

Aberdeen Royal Infirmary.—Jun. Asst. Surgeon.
Aberdeen Woodend Municipal (General) Hospital.—Jun. Res. M.O. £100.
Accrington, Victoria Hospital.—H.S. £150.
Acton Borough Education Committee, W.—Asst. School M.O. and Asst. M.O.H. £550.
Altrincham General Hospital.—Jun. H.S. At rate of £120.
Ashton-under-Lyne, District Infirmary.—Res. Surg. O. £200.
Bedford County Hospital.—Asst. H.S. At rate of £130.
Birmingham and Midland Eye Hospital, Church-street.—H.S. £110.
Birmingham City Education Committee.—Special Schools M.O. and Director of Child Guidance Clinic, not exceeding £800. Also Two Asst. School M.O.'s. Each £500.
Birmingham, Little Bromwich Hospital for Infectious Diseases.—Jun. Asst. M.O. £300.
Birmingham, Monyhull Colony.—Second Asst. M.O. £350.
Birmingham, Selly Oak Hospital.—Cas. O. At rate of £200.
Blackburn County Borough.—Asst. School M.O. and Asst. M.O.H. £700.
Brighton Sanatorium and Infectious Disease Hospital.—Jun. Res. M.O. At rate of £150.
Bristol Royal Infirmary.—H.P. Also Asst. H.S. Each at rate of £60.
Burnley County Borough.—Asst. M.O.H. and Asst. School M.O. £500.
Chester, Wrenbury Hall Tuberculosis Training Colony.—H.P. £250.
City of London Maternity Hospital, City-road, E.C.—Asst. Res. M.O. At rate of £80.
Connaught Hospital, Walthamstow, E.—Sen. Res. H.S. At rate of £150.
Derby County Mental Hospital, Mickleover.—Res. Jun. Asst. M.O. £350.
Derby, Derbyshire Hospital for Women, Friar Gate.—H.S. At rate of £150.
Dudley Guest Hospital.—H.S. £170–£200.
***East Ham Memorial Hospital, Shrewsbury-road, E.*—H.P. At rate of £150. Also H.S. to Special Depts. and Cas. O. Each at rate of £120.**
Great Yarmouth General Hospital.—H.S. £140.
Guildford, Royal Surrey County Hospital.—H.S. £150.
Hammersmith Hospital, Ducane-road, W.—Asst. M.O. £350.
Hastings, Royal East Sussex Hospital.—Sen. H.S. At rate of £150.
Hereford County and City Mental Hospital.—Med. Supt. £600.
Hertford, Watford Maternity and Nursing Home.—Visiting M.O. £120.
Hospital for Sick Children, Great Ormond-street, W.C.—H.S. and H.P. Each at rate of £100.
Hull Royal Infirmary.—Hon. Asst. Physician.
Ilford, King George Hospital.—H.S. At rate of £100.
Kidderminster and District General Hospital.—H.S. £150.
King's College Hospital, Denmark Hill, S.E.—Hon. Anæsthetist.
Lingfield, Surrey, Epileptic Colony.—Asst. M.O. £275.
***Liverpool Eye and Ear Infirmary, Myrtle-street.*—H.S. to Ophth. Dept. £120.**
Liverpool Royal Southern Hospital.—H.P., M.O. to Spec. Depts., and Res. Anæsthetist. All at rate of £60.
Liverpool, St. Paul's Eye Hospital, Old Hall-street.—H.S. At rate of £120.
London Female Lock Hospital, Harrow-road, W.—H.S. At rate of £150.
Longton Hospital, Staffs.—H.S. £150.
Macclesfield General Infirmary.—Sen. and Jun. Res. M.O.'s. At rate of £180 and £150 respectively.
Manchester, Ancoats Hospital.—Res. Surg. O. £200.
***Manchester Royal Eye Hospital.*—Jun. H.S. £120.**
Manchester, Royal Infirmary.—Jun. Asst. M.O. for Radiological Dept. £400.
***Margate Royal Sea Bathing Hospital for Surgical Tuberculosis.*—H.S. At rate of £200.**
Miller General Hospital, Greenwich-road, S.E.—Hon. Gynæcologist. Also Cas. O. and H.P. At rate of £150 and £125 respectively.
National Hospital, Queen-square, W.C.—Asst. Registrar. £200.
Newcastle-upon-Tyne, Royal Victoria Infirmary.—Hon. Physician to Skin Dept.
Norwich, Norfolk and Norwich Hospital.—H.S. £120.
Portsmouth, Royal Portsmouth Hospital.—Cas. O. At rate of £100.
Princess Beatrice Hospital, 194, Finborough-road, S.W.—R.M.O.
Putney Hospital, Lower Common, Putney, S.W.—Res. M.O. At rate of £150.
***Queen's Hospital for Children, Hackney-road, E.*—H.P. At rate of £100.**
Reading, Royal Berkshire Hospital.—Radiological H.S. and Res. Anæsthetist. At rate of £150.
Richmond, Surrey, Royal Hospital.—Hon. Surg. to Ear, Nose, and Throat Dept.
Rochdale Infirmary and Dispensary.—Jun. H.S. £200.
Royal Eye Hospital, St. George's Circus, S.E.—Twelve salaried Refractionists, twelve Clin. Assts., and Pathologist.
Royal National Orthopædic Hospital, 234, Great Portland-street, W.—Two H.S.'s. Each at rate of £150. Also H.S. for County Branch, Brockley Hill, Stanmore. At rate of £150.
Royal Waterloo Hospital for Children and Women, Waterloo-road, S.E.—Cas. O. At rate of £200. Also H.S. At rate of £100.
St. Giles Hospital, Brunswick-square, Camberwell, S.E.—Part-time Radiologist. At rate of £236 5s.
St. Mary's Hospital, W.—2nd Asst. Pathologist. £250. Also Obstetric Registrar. £50.
St. Thomas's Hospital, S.E.—Res. Asst. Surgeon. Also Surg. Reg.
Salford Royal Hospital.—Res. H.S.'s. to Special Depts. Also Cas. H.S. All at rate of £125.
Scarborough Hospital and Dispensary.—Two H.S.'s. Each at rate of £175.
Scotland, Department of Health.—M.O. £600.
***Sheffield, Jessop Hospital for Women.*—Sen. Res. M.O. £200. Also Res. M.O. and two Asst. H.S.'s. At rate of £150 and £100 respectively.**
***Sheffield Royal Hospital.*—Ophth. H.S. Also Anæsthetist. £120 and £80 respectively.**
***Sheffield Royal Infirmary.*—Asst. Aural and Ophth. H.S. and H.S. and Second Asst. Cas. O. Each at rate of £80.**
Southampton County Borough.—Asst. M.O.H. £500.
***Stafford, Staffordshire C.C. County Bacteriological Laboratory.*—Asst. Bacteriologist and Pathologist. £700.**
Stamford, Stamford, Rutland and General Infirmary.—H.S. At rate of £150.
Sutton and Cheam Hospital.—Res. M.O. At rate of £150.
Swansea, Infectious Diseases Hospital.—Res. M.O. £350.
Taunton, Taunton and Somerset Hospital.—Asst. H.S. At rate of £100.
***Watford, Herts., Peace Memorial Hospital.*—Res. and Surg. M.O.'s. Each at rate of £150.**
Wells, Somerset, Mental Hospital.—Asst. M.O. £350.
***West London Hospital, Hammersmith-road, W.*—H.P., H.S.'s, and Res. Anæsthetist. All at rate of £100.**
West Riding of Yorkshire County Council.—Temp. Sch. Med. Inspectors. £500.
***Windsor, King Edward VII. Hospital.*—H.S. At rate of £100.**
Woolwich and District War Memorial Hospital, Shooters Hill, S.E. Res. M.O. £175.

The Chief Inspector of Factories announces vacant appointments for Certifying Factory Surgeons at Milnthorpe (Westmorland), at Ulceby (Lincoln), and at Holt (Norfolk).

Births, Marriages, and Deaths

MARRIAGES.

HIGGINS—HODGKINSON.—On Sept. 3rd, at St. Philip's Church, Alderley Edge, James Basil Higgins, M.B., Ch.B. Vict., D.M.R.E. Camb., to Muriel Betty Hodgkinson, daughter of Mr. and Mrs. E. Nicholls Hodgkinson, of Wilmslow.

SATCHWELL—JONES.—On Sept. 1st, at Llanfyllin, Montgomeryshire, Hubert John Satchwell, M.B., Ch.B. Bristol, of North Curry, Somerset, to Mary Glennie Jones, M.B. Ch.B. Liverp., of Llanfyllin.

TYLOR—BAZETT.—On Sept. 3rd, at Totnes, Devon, Max F. Tylor, M.B., B.Ch. Oxf., of Dartmouth, to Christine Margaret Bazett, second daugher of Mr. Charles Bazett and the late Mrs. Bazett, of Victoria, British Columbia.

WALKER—MCCORMICK.—On Sept. 5th, at Holy Trinity Church, Brompton, Robert Milnes Walker, M.S. Lond., F.R.C.S. Eng., of Wolverhampton, to Grace Anna, eldest daughter of Dr. and Mrs. McCormick, of London.

DEATHS.

BARBOUR.—On August 31st, at Portsea-place, Hyde Park, W., James Barbour, M.D. Edin., in his 83rd year.

BLURTON.—On Sept. 6th, suddenly, at West Bridgford, Nottingham, Gilbert Blurton, M.B., B.S. Lond., aged 39.

HARWOOD.—On August 31st, suddenly, in London, Thomas Eustace Harwood, M.B., Ch.B. Edin., aged 56.

PARR-DUDLEY.—On August 31st, at the Hospital, Maidstone, A. Dudley Parr-Dudley, Barrister-at-Law, M.R.C.S., L.R.C.P. Lond., of East Malling, Kent, formerly of Cossington, Leicestershire, aged 72.

RICHARDS.—On Sept. 4th, Ramsey Martyn Richards, M.R.C.S. Eng., L.R.C.P. Lond., Surgeon Captain R.N., retired, of Betworth, Exmouth, aged 56.

SAMBON.—On August 31st, suddenly, in Paris, Prof. Louis W Sambon, M.D. Naples, of Fordwych-road, London.

WHITE.—On Sept. 3rd, at Weston-super-Mare, and late of Cambridge, Sidney Hugh White, M.R.C.S. Eng., L.R.C.P. Lond., Surgeon Captain R.A.M.C., aged 58.

WHITEHEAD.—On Sept. 1st, at the London Hospital, Henry Edward Whitehead, M.R.C.S. Eng., L.R.C.P. Lond., of Caledonian-road, N., aged 69.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages and Deaths.

NOTES, COMMENTS, AND ABSTRACTS

BRITISH WATERWORKS.

WE have received from the British Waterworks Association a copy of their Yearbook and Directory for 1930–31. This is the third edition of a reference book of great usefulness, edited by Mr. G. P. Warner Terry, barrister-at-law, which may be had for one guinea, post free, from the Secretary of the Association, 173, Rosebery-avenue, London, E.C. 1. The major part of the book consists of an alphabetical directory of waterworks throughout England and Wales, embodying replies to a questionaire, and containing information under headings such as Date of Establishment, Special Acts, Limits of Supply, Character of Water, Source of Supply, Service Reservoirs, Domestic Charges, and so forth. Following this is a series of statistical tables, also compiled from actual returns received. Table 4, which is of special interest, gives the average supply of water per day per head of population in the area, which varies from 10 gallons for West Mersea, and 11 gallons for Cardiff rural, up to 95 for Irvine, 108 for Burntisland, and 180 for Greenock, most of the large municipalities providing 25–35 gallons a head. The time is not far distant when water authorities may have to combine to consider, in the interests of municipal economy, what is the minimum amount of water which covers the whole demands of health and reasonable comfort. Since an inch of rainfall on an acre of land yields more than 22,000 gallons of water, it might be thought that some of these figures are stingy, but only a small proportion of this rainfall can ever reach the waterworks pumps, and it is not long ago that a general water shortage was feared. The twelfth annual report of the Ministry of Health admits that much remains to be done before the water supply in rural areas can be regarded as satisfactory, and alludes to the need of gauging rivers and underground waters.

ROYAL INSTITUTE OF PUBLIC HEALTH.

IN addition to the places mentioned on page 495 of the Students' Guide (THE LANCET, August 29th), courses of study for public health degrees and diplomas are offered in London by the Royal Institute of Public Health. The syllabus is covered by a teaching staff of nine under the headings Chemistry and Physics, Hygiene Physiology and Physiotherapy, Applied Bacteriology and Immunology, General Principles of Public Health, Epidemiology and Vital Statistics, Sanitary Law and Administration, Public Health Administration, Sanitary Construction and Planning, Port Sanitary Administration, Meat and Food Inspection. The course includes the practical work of a medical officer of health, visits to places of public-health interest, and instruction in the selection of building sites, heating, lighting and ventilation of occupied premises, and so forth. There is a composition fee for the whole course, which can be commenced at any time. Particulars from the secretary at 37, Russell-square, London, W.C. 1.

THE BEAD TEST OF GASTRO-INTESTINAL FUNCTION.

UNDER the auspices of the French Government a group of American doctors recently visited the principal thermal and climatic resorts of France. The visitors included Dr. Max Einhorn, who gave a lecture at Vichy on the Bead Test (digestive test capsules). He explained that the method consisted in causing the patient to swallow a little capsule containing beads attached to a thread, each bead being covered with different types of food, to test the activity of the digestive process in the different parts of the intestinal tract. The food substances employed are catgut, fishbone—to test gastric digestive function—and meat, thymus, mutton fat, potato (with the peel)—to test intestinal digestive function. The capsule is swallowed after a meal, and the beads are evacuated per rectum, after a period which may indicate some degree of stasis or too rapid passage of foodstuffs through the intestinal canal. The beads are then gently washed in cold water, and examined, in order to ascertain the degree of digestion undergone by each of the nutritive substances which covered them. Dr. Einhorn said that the test had enabled him to classify gastro-intestinal dyspepsia into three categories: partial, total, and nervous dyspepsia, the latter being purely functional.

WALKING ON THE MOORS.

Mr. W. Ridley-Makepeace has followed up his little book on Goathland Walks by a further series of Walks and Talks on the North Yorkshire Coast and Moors. (London: A. Brown and Sons, Limited. 5, Farringdon-avenue, E.C. 4. Pp. 120. Price 1s.) He is a rambler of sixty years' standing, who desires to attract the north, south, and west to a part of England which he regards as the pedestrians' paradise. He describes and illustrates a series of eleven walks, with a wealth of interesting detail, historical and topographical. As a whole-hearted walker, he also devotes space to the dangers of motor-vehicle traffic, and to the slovenly and dirty habits of picnickers who leave their litter behind, quoting with approval Mr. F. A. Rush's lines which begin—"Why dost ta' throw thi rubbish here, Tha mucky lout?" and, with some change of vernacular, might be posted on every spot of open ground in the country. The booklet is made more valuable by a complete index.

COINING NEW WORDS.

To the Editor of THE LANCET.

SIR,—New words are always being coined, and anybody may do so by design, native wit, or mere accident. The *Times* some time ago accidentally invented the word "carbarian" for barbarian. A policeman at Stratford police-court this week called a pillion rider on a bicycle (a female, but either sex could have been meant) a "pillionaire." Last week I read in a Paris journal of a Russian who had lost his right leg, and was described as "l'unijambiste." This word is new to me, and not in my up-to-date "Nouveau Petit Larousse," although "manchot" (estropié ou privé d'une main ou d'un bras) as applied to one-handed or one-armed is there. For "unijambiste" I suggest in English "one-legger."

I am, Sir, yours faithfully,

Sept. 5th, 1931. BLANCUS.

Medical Diary

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE AND POST-GRADUATE MEDICAL ASSOCIATION, 1, Wimpole-street, London, W.

MONDAY, Sept. 14th to SATURDAY, Sept. 19th.—INFANTS HOSPITAL, Vincent-square, S.W. Post-graduate Course in Diseases of Infants. Every afternoon at 2 P.M.—CENTRAL LONDON OPHTHALMIC HOSPITAL, Judd-street, W.C. Course in Ophthalmology. Every afternoon. Demonstrations and lectures, and hospital practice. Fee £3 3s.—WESTMINSTER HOSPITAL, S.W. Post-graduate Course in Medicine and Surgery and the Specialties. Men only. 10.30 A.M. to 5.30 P.M. daily. —Further particulars from the Fellowship of Medicine.

CENTRAL LONDON THROAT, NOSE, AND EAR HOSPITAL, Gray's Inn-road, London, W.C.

FRIDAY, Sept. 18th.—4 P.M., Mr. A. Lowndes Yates: Incipient Deafness.

ST. MARK'S HOSPITAL, City-road, E.C.

THURSDAY, Sept. 17th.—4.30 P.M., Dr. Browning Alexander: Visceroptosis.